

POWER MONITORING & PROTECTION



We Stock a Wide Variety to Meet Your Energy Management Requirements.

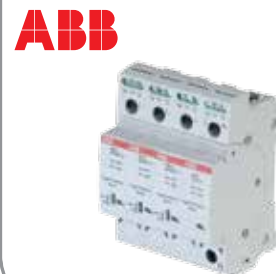
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Products manufactured
in the United States



Products that are
new to the catalog



POWER MONITORING
& PROTECTION

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SCX Series | p. 950



A/CR-12DC-12A | p. 942



kele.com

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POWER MONITORING & PROTECTION

INTELLIGENT POWER MONITOR ENGENIUS™ - PATENT PENDING



DESCRIPTION

The **EnGenius™** is a two processor based power monitoring device that monitors and records numerous power system parameters. The **EnGenius™** continuously measures voltage and current to calculate and display over 57 values. 120 to 600V can be monitored without the need of potential transformers. 601 to 32000 V can be monitored with the use of potential transformers. All scaling calculations are handled by the meter.

The **EnGenius™** comes standard in a NEMA 4 rated enclosure ready to be mounted. A data port is provided on the front interface for easy setup and trend retrieval via **EnGenius™** desktop software. Built for the future, the **EnGenius™** allows for feature upgrades through the data port.

FEATURES

- **NEMA 4 enclosure standard**
- **KWH Accuracy class 0.5% ANSI C12.20** For meter alone with unmatched CT's OR for Meter-CT set with factory calibrated matched CT's
- **Data port for setup and trend retrieval**
- **Measure voltages up to 32000 VAC (*voltages over 600VAC require the use of a potential transformer, not included)**
- **Supports 0.333V safe CTs and 5 AMP CTs (must use optional 5 AMP adapter board)**
- **Supports 1V and 2 V CT's (must use ENG-2VT/1V-ADPTR)**
- **BACnet MSTP, Lonworks, N2 and Modbus RTU available**
- **Password protected configuration**
- **Powered by separate 24 VAC supply**
- **On board data logging**
- **Auto configuration**
- **Upgradable firmware through data port**
- **Bidirectional power measurement**
- **CSI approved**

NEW!

Kele



EnGenius™ Patent Pending



PARAMETERS

Parameters that can assigned to 4-20 mA output:

- Total Positive KW
- Total Bi-directional KW (12 mA = 0 KW)
- Total Sliding Window KW (user configured, 5 to 60 min.)
- Peak Sliding Window KW
- Total KVA
- Total PF
- Average System Volts
- Average System Amps

Parameters that can be assigned to Digital Outputs:

- Positive KWH pulse
- Negative KWH pulse
- Low volts - alarm
- Unbalanced volts - alarm
- Low or unbalanced volts - alarm

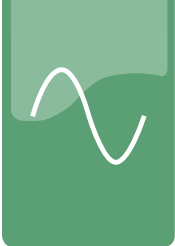
POWER MONITORING & PROTECTION

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SPECIFICATIONS

Supply Voltage	24 VAC ± 10% 60Hz	Analog Output Type	1 Output 4-20 mA (loop powered)
Supply Current	250 mA maximum	Accuracy	0.5% full scale
Monitored Voltage		Maximum Loop Supply Voltage	30 VDC
Line to Line	120 to 600 VAC	Maximum Impedance	850Ω @ 24 VDC
Line to Line with potential transformer		Digital Output Type	2 Outputs Optically isolated solid state FET switch
Monitored Current	601 to 32000 VAC 5 to 6000A using current transformers	Rated Voltage	28 VAC/40 VDC maximum
System Type	2-Wire Single Phase 3-Wire Single Phase 4-Wire Wye 3-Wire Delta 4-Wire Delta	Rated Current	00 mA maximum
Communication Data Port	Serial interface to EnGenius™ Desktop Software	Operating Temperature	-22° to 158°F (-30° to 70°C)
OPTIONAL Communications (not field installable)	BACnet MS/TP Lonworks Modbus RTU N2	Operating Humidity	0 to 95% (non-condensing)
		Enclosure	NEMA 4, UL94 rated 5VA
		Dimensions	6.5" x 6.5" x 4" (16.5 x 16.5 x 10.1 cm)
		Weight	3.1 lb (1.4 kg)
		Approvals	ETL, CE File #4004284
		RoHS Statement	Yes
		Warranty	1 year

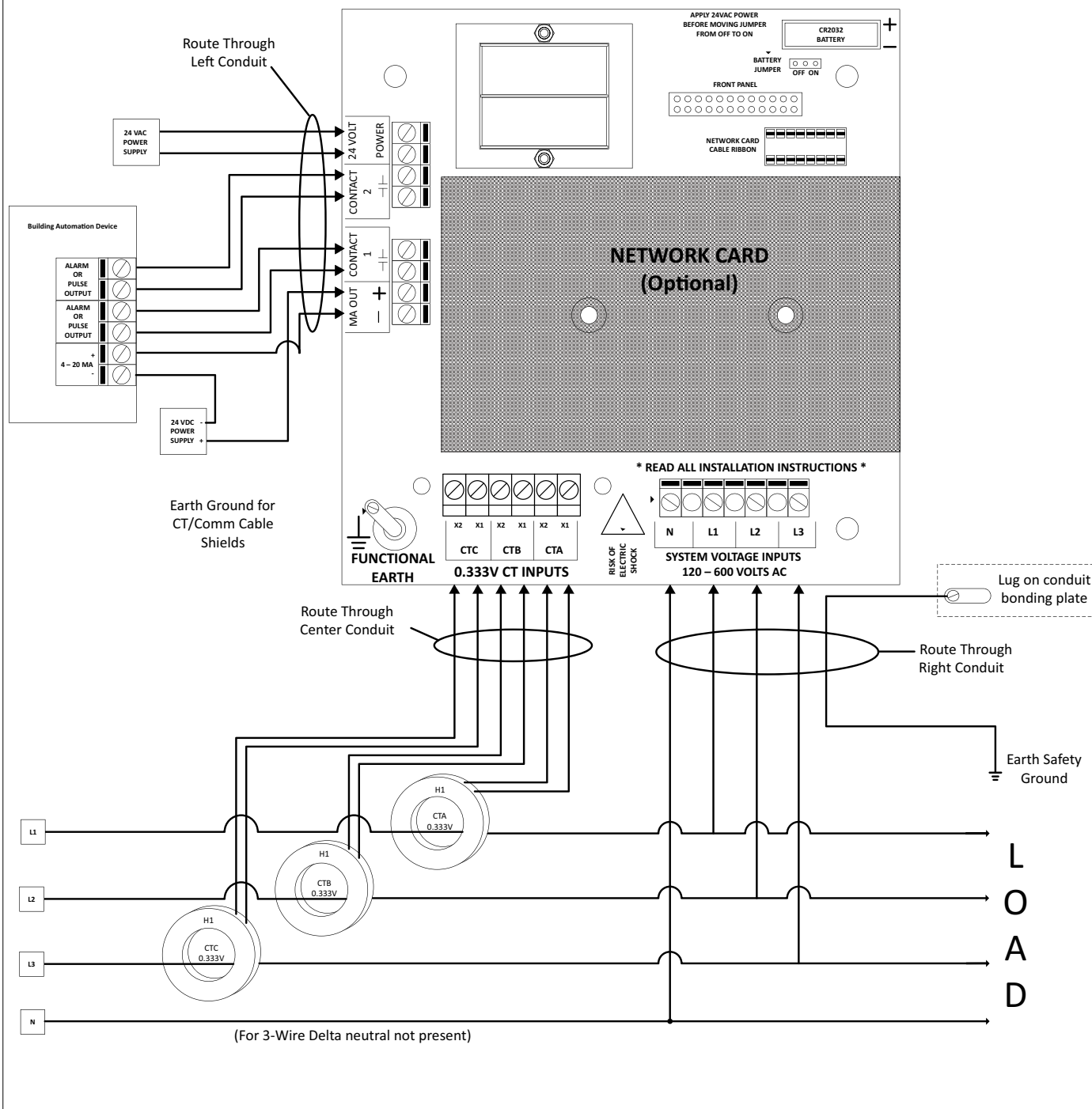
NEW!



POWER MONITORING & PROTECTION

INTELLIGENT POWER MONITOR
GENIUS™ - PATENT PENDING

WIRING - .333 V CURRENT TRANSFORMERS, 3-PHASE POWER SYSTEMS

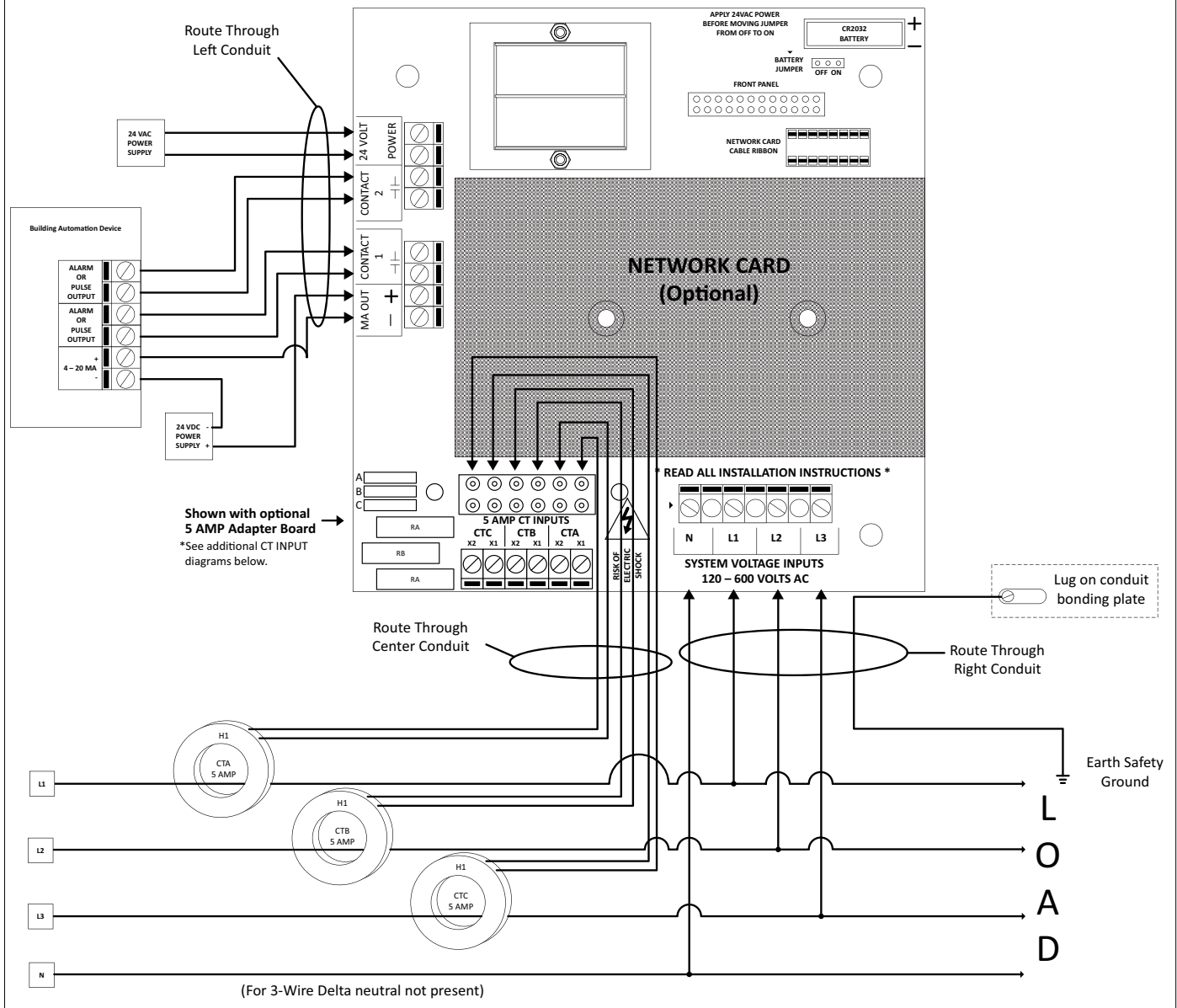


POWER MONITORING & PROTECTION

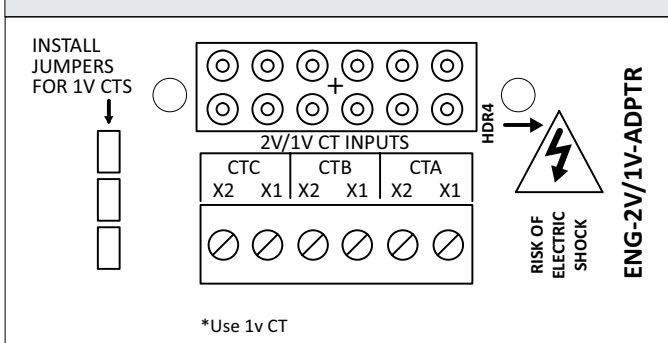
INTELLIGENT POWER MONITOR
ENGENIUS™ - PATENT PENDING



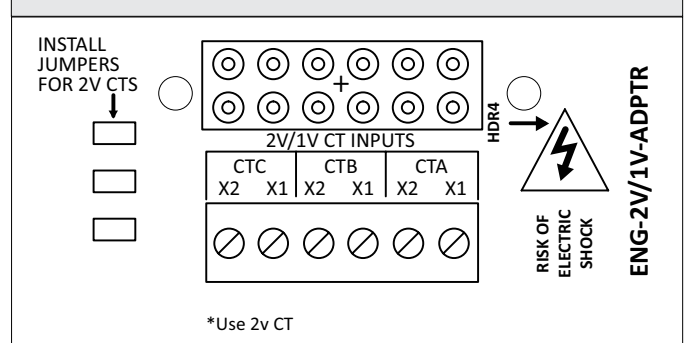
WIRING - 5 AMP CURRENT TRANSFORMERS, 3-PHASE POWER SYSTEMS



1V CT INPUTS



2V CT INPUTS





POWER MONITORING & PROTECTION

INTELLIGENT POWER MONITOR

GENIUS™ - PATENT PENDING

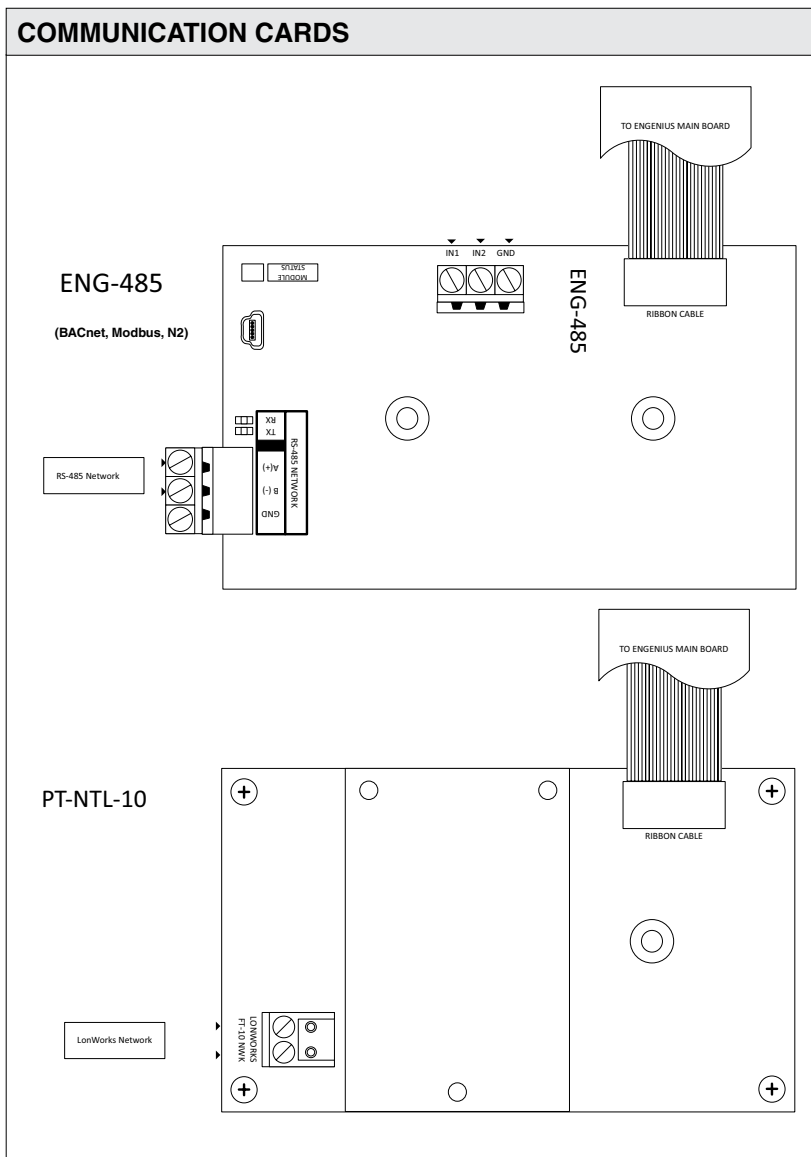
Parameters Available Via Display/Network*

Total KW*
Total Sliding Window KW (period programmable 5-60 minutes)
Total KVAR
Total KVA*
Phase A KW*
Phase B KW*
Phase C KW*
Phase A KVAR*
Phase B KVAR*
Phase C KVAR*
Phase A KVA
Phase B KVA
Phase C KVA
Total PF*
Phase A PF*
Phase B PF*
Phase C PF*
Average L-N Volts
Average L-L Volts
L1-L2 Volts**
L2-L3 Volts**
L3-L1 Volts**
L1-N Volts**
L2-N Volts**
L3-N Volts**
Average Amps
Phase A Amps*
Phase B Amps*
Phase C Amps*
Total Positive KWH*
Total Negative KWH
Total Absolute KWH (Sum of positive and negative)
Total Net KWH (Positive minus negative)
Phase A Positive KWH
Phase B Positive KWH
Phase C Positive KWH
Phase A Negative KWH
Phase B Negative KWH
Phase C Negative KWH
Total Positive KVARH
Total Negative KVARH
Total Absolute KVARH
Total Net KVARH
Phase A Positive KVARH
Phase B Positive KVARH
Phase C Positive KVARH
Phase A Negative KVARH
Phase B Negative KVARH
Phase C Negative KVARH
Timestamp (When energy counters were last cleared)
Peak Sliding Window KW (since last cleared)*
Timestamp (when Peak Sliding Window occurred)
Timestamp (when Peak Sliding Window KW was last cleared)

*ONLY Values with asterisk are available for LONWORKS

** For Delta System For WYE System
Phase A = L1-L2 Phase A = L1-N
Phase B = L2-L3 Phase B = L2-N
Phase C = L3-L1 Phase C = L3-N

COMMUNICATION CARDS





ORDERING INFORMATION

ENG	EnGenius Intelligent Power Monitor	
	9000	.333V input
	9500	5 Amp input
	B	BACnet Communication Board
	L	LonWorks Communication Board
	M	Modbus Communication Board
	N	N2 Communication Board
	D	Display
	T	Trend Data Logging

Example: ENG-9000-B-D = EnGenius .333V input with BACnet and display.
ENG-9000-B-D-T = Additional feature of trend data logging.

Note: CT's are ordered separately and not included in the above part numbers.

ACCESSORIES		PAGE
ENG-2V/1V-ADPTR	2V or 1V input adapter board for ENG-9000	919
ENG-485	BACnet, Modbus, N2 Communication Board	918
ENG-5AMPBRD	5 Amp Input adapter board for ENG-9000	919
ENG-CABLE	Data Cable for EnGenius™	919
ENG-SOFTWARE	Desktop Software for EnGenius™	919
PT-NTL-10	LonWorks communications module	918

RELATED PRODUCTS		PAGE
500T, 501T	Split-Core Current Transformer, 5A Secondary	935
600T, 601T	Split-Core Current Transformer, 5A Secondary	935
RCT-1800 Series	Rogowski Coil Flexible Current Sensor, 0.333V Secondary	933
SCT Series	Split-Core Current Transformer, 0.333V Secondary	932
UCT Series	Solid-Core Current Transformer, 0.333V Secondary	938



POWER MONITORING & PROTECTION

COMMUNICATION MODULES FOR ENGENIUS™

ENG-485, PT-NTL-10

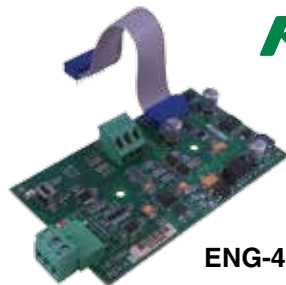
DESCRIPTION

The **ENG-485** and **PT-NTL-10** are communication modules for EnGenius™ Intelligent Power Monitor. They read data from the EnGenius™ main processor, format the data, and transmit it to a network. They allow all of the power system parameters measured by the EnGenius™ to be monitored over a single pair of wires. The **ENG-485** contains BACNET, Modbus and N2 communication protocols. The chosen communication protocol is selected either through the front panel display/keypad or the desktop software.

The **ENG-485** features 2 contact-closure inputs for monitoring external equipment. Each input can be configured to read contact state (On/Off) or as a Pulse Counter to count pulses from flow meters or other power meters. In the Pulse Counter mode, a Clear command is available to reset the pulse count when desired.

The **PT-NTL-10** is a dedicated Lonworks communication module. This module does not have the 2 contact-closure inputs.

NEW!



ENG-485

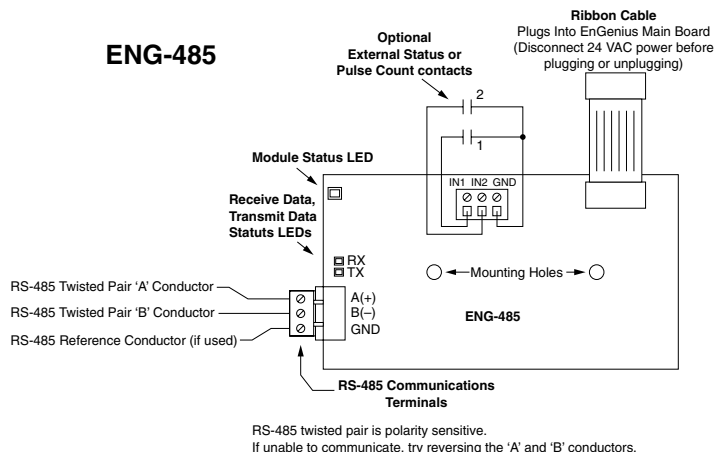
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FEATURES

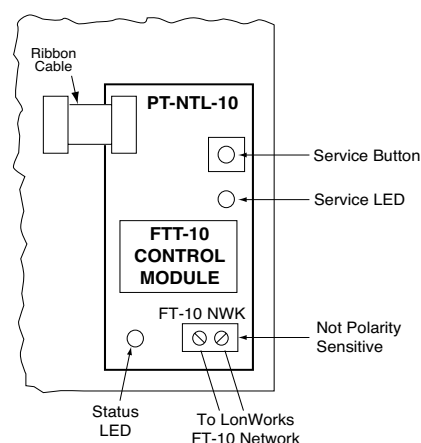
- **ENG-485** contains BACnet, Modbus & N2 communication protocols on one board. The chosen one is selected either through the front panel display/keypad or through the optional Desktop Software.
- **2 Contact-closure inputs**
- **PT-NTL-10** is a dedicated Lonworks module. This protocol has a subset of values. See data sheet for details.

WIRING

ENG-485



PT-NTL-10



SPECIFICATIONS

Communication

PT-NTL-10 LonWorks FTT-10 transceiver

ENG-485 BACNet, Modbus, N2

Connections

Pluggable screw terminals

Operating Temperature

PT-NTL-10 32° to 122°F (0° to 50°C)

ENG-485 14° to 122°F (-10° to 50°C)

Operating Humidity

0-95% RH non-condensing

Dimensions

PT-NTL-10 4.5"H x 2.6"W x 1.7"D
(11.4 x 6.6 x 4.3 cm)

ENG-485 4.5"H x 2.6"W x 0.6"D
(11.4 x 6.6 x 1.5cm)

Weight

PT-NTL-10 0.7 lb (0.32kg)

ENG-485 0.1 lb (0.05 kg)

Approvals

PT-NTL-10 UL listed, File #E161500
Certified to LonMark Interoperability Guidelines v 3.1

Warranty

18 months

ORDERING INFORMATION

MODEL

ENG-485

PT-NTL-10

DESCRIPTION

BACnet, Modbus, N2 Communication Board

LonWorks communications module

NEW!



DESCRIPTION

EnGenius™ Accessories help you get the most out of the EnGenius power monitor. With these and future available accessories, the EnGenius can be kept up to date. Available accessories are the software, data cable, 5 Amp CT input adapter board and a safe current transformer 2V/1V input adapter board. The 2V/1V adapter board is configurable to the application you need.

FEATURES

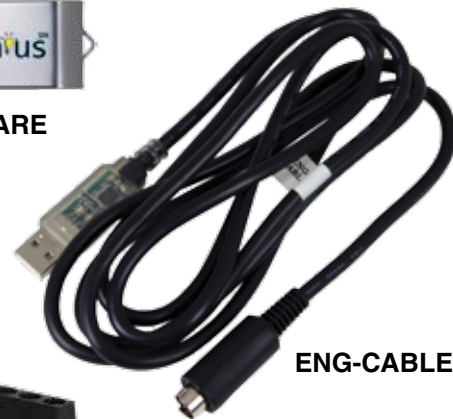
- **ENG-CABLE** - LED lights indicate when the Desktop Software is being transmitted to the EnGenius™ intelligent power monitor and when data is being downloaded into the computer.
- **ENG-SOFTWARE** - The Desktop Software is conveniently loaded on this flash drive. This software will enable you to easily and conveniently interact with EnGenius™ intelligent power monitor via the data cable. You can quickly program one power monitor, save to your desktop/laptop and then program several more power monitors in a timely fashion. You will also be able to download the information from the EnGenius™ and analyze the data.
- **ENG-2V/1V-ADPTR** - Use this adapter board to retrofit an EnGenius™ to accept safe CTs with either 2V or 1V secondary output. The same board can be used for either application. Just change the DIP switches to the configuration you need.
- **ENG-5AMPBRD** - Use this adapter board to retrofit an EnGenius™ to accept current transformers with 5A secondary output.

NEW!

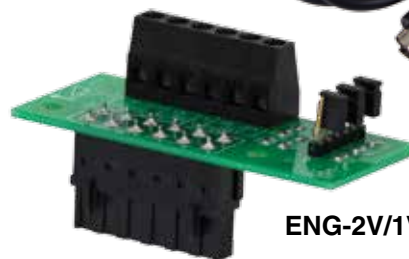
Kele®



ENG-SOFTWARE



ENG-CABLE



ENG-2V/1V-ADPTR



ENG-5AMPBRD

SPECIFICATIONS

Dimensions		Weight	
Cable	36" (0.9m) length	Cable	0.55 lb (0.25 kg)
Flash Drive	2.25" x 0.625" (5.72 x 1.59 cm)	Flash Drive	0.01 lb (0.004 kg)
5AMP and 2V/1V Adapter boards	2" x 3.5" (5.08 x 8.89cm)	5AMP and 2V/1V Adapter boards	0.35 lb (0.16 kg)
		Warranty	1 year

ORDERING INFORMATION

MODEL	DESCRIPTION
ENG-CABLE	Data Cable for EnGenius™
ENG-SOFTWARE	Desktop Software for EnGenius™
ENG-5AMPBRD	5 Amp Input adapter board for ENG-9000
ENG-2V/1V-ADPTR	2V or 1V input adapter board for ENG-9000

RELATED PRODUCTS	
AH04	Fuse pack, 3 Phase

NEW!



POWER MONITORING & PROTECTION

POWER QUALITY METERS PQUBE SERIES

DESCRIPTION

The **PQube** is a high-precision power quality and energy monitor. This will record the details of every power disturbance on a removable SD card. The **PQube** AC power monitor can handle up to 690V, 50/60/400Hz three-phase systems. It will record voltage dips, swells and interruptions and will give you waveforms and RMS graphs. No software is required, the programming is embedded. The **PQube** system has been designed to be plug and play so modules are easily added. DIN rail mount or optional panel mount bracket.

FEATURES

- *Three-phase and single phase monitoring up to 690V, 50/60/400Hz*
- *Auto power configuration*
- *Voltage dips, swells, and interruptions - waveforms and RMS graphs - recorded on removable SD card*
- *Email alerts and Excel reports available with optional ethernet module*
- *1-microsecond high-frequency events*
- *Power from 24VAC, 24VDC~48VDC*
- *Optional power supply modules for 100V~240V supply*
- *All modules are DIN rail mount*

**CAUTION: MUST HAVE EARTH GROUND
TO WORK PROPERLY**

SPECIFICATIONS

Supply Voltage	24 VAC 60/60 Hz 5 VA, 24-48 VDC
Monitored Voltage	100 to 690V
System Type	Three-phase (Wye or Delta), single-phase
Frequency Range	40 to 70 Hz and 320 to 560 Hz
Measurement Channels	L-N, L-L, N-E
Monitored Current	Up to 6000 A with input module
Relay Output	30 VAC/VDC, 300 mA max
Communication Connection	Mini-B USB socket
Data Storage	4 GB Scan Disk card (included)
Operating Temperature	-4° to 122°F (-20° to 50°C)
Operating Humidity	up to 95% RH
Mounting	DIN rail
Weight	0.73 lbs (0.331 kg)
Approvals	CE, RoHS, UL file#E220936
Warranty	1 year

NEW!



PQube

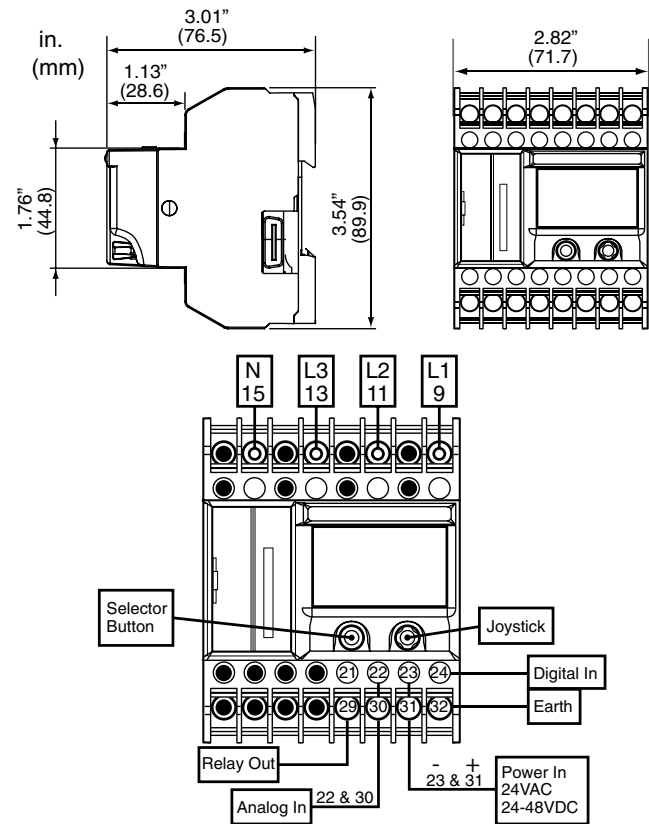
PSI



PS1



DIMENSIONS



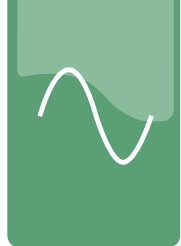
ORDERING INFORMATION

MODEL	DESCRIPTION
PQube-02-0000	PQube power quality meter-4 AC voltage inputs, 2 analog inputs, 1 digital input, 1 relay output
PQube-02-0100	PQube power quality meter-4 AC voltage inputs, 2 analog inputs, 1 digital input, 4 relay outputs
PS1-100~240-00	Power supply PQube from 100V~240V, 50/60 Hz
ENCL-EXT1074-01	Enclosure for PQube Assembly, 10 x 7.2 x 4.3", IP65 rated
PQUBE BATTERY	Replacement battery, lithium polymer; 0.6 AMP-hour

NEW!

POWER MONITORING & PROTECTION

CURRENT TRANSFORMER INTERFACE MODULES PQUBE XCT, CT, ETHERNET MODULES



PSI

cUL US

CE



DESCRIPTION

The **XCT** current transformer modules connects your existing CT's to your **PQube**. The external CT input ratio range is 1:1 to 1000:1. The **XCT4 Series** connect directly to current transformer secondary wires and has 4 channels of current monitoring. The **XCT5 Series** connects directly to voltage output current transformer wires and has 5 channels of current monitoring. The **CT4** is a current sensing module that has 20Amp input. Just feed the wires through the opening.

FEATURES

- Accuracy $\pm 1\%$ (plus uncertainty of external CT's)
- Adds current waveforms to PQube events
- Enables power consumption and energy monitoring
- Crest factor typically 3.5 times rated input

SPECIFICATIONS

- 2.8"W x 3.5"H x 3.2"L (7.1 x 8.9 x 8.1 cm)
- 0.5 lbs (0.22 kg)

NEW!



XCT4



XCT5

ORDERING INFORMATION

MODEL	DESCRIPTION
XCT4-1A-00	Interface module for CT's with 1 Amp output
XCT4-5A-00	Interface module for CT's with 5 Amp output
XCT5-0.333V-00	Interface module for CT's with 0.333V output
XCT5-1V-00	Interface module for CT's with 1V output
XCT5-5V-00	Interface module for CT's with 5V output
XCT5-10V-00	Interface module for CT's with 10V output
CT4-20A-00	Current sensing module 20Amp input

DESCRIPTION

The **ETH1** Ethernet module automatically sends you an email whenever a disturbance occurs, complete with picture and Excel compatible attachments. The **CTE1** Modules combine the **XCT5** current sensing and the **ETH1** ethernet into a single package.

FEATURES

- Built in web server
- See status of the PQube and look at event and trend recordings
- Update firmware and reset remotely
- Free email account with each PQube
- Synchronize to UTC time standard
- DHCP/Fixed IP, POP, SMTP, FTP, Modbus/TCP

SPECIFICATIONS

- 2.8"W x 3.5"H x 3.2"L (7.1 x 8.9 x 8.1 cm)
- 0.5 lbs (0.22 kg)

NEW!



CTE1



ETH1

PSI

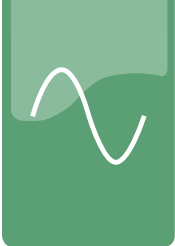
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CE



ORDERING INFORMATION

MODEL	DESCRIPTION
ETH1-10T-00	Ethernet module with email account
CTE110T0.333V00	Combined ethernet & CT module for 0.333V CT's
CTE1-10T-1V-00	Combined ethernet & CT module for 1V CT's
CTE1-10T-5V-00	Combined ethernet & CT module for 5V CT's
CTE1-10T-10V-00	Combined ethernet & CT module for 10V CT's



POWER MONITORING & PROTECTION

HIGH ACCURACY SPLIT CORE CURRENT SENSORS

PQUBE SCN SERIES

DESCRIPTION

These **SCN Series** of **split core** current sensors easily clamp around existing conductors. They range from 1A - 600A primary input/ 333mV output. They are for use with the **XCT5** and **CTE1 Series** of current transformer interface modules.

FEATURES

- Accuracy $\pm 0.2\%$
- Phase angle: 0.2°
- Crest factor 3.5 times nominal CT rating
- 8ft. leads, 18 AWG twisted pair
- 1 year warranty

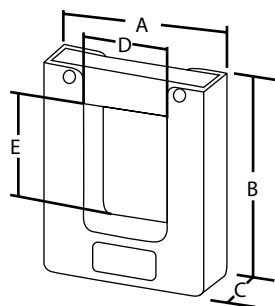
NEW!



SCN Snaptop



DIMENSIONS

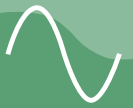


PSL Part Number	Dimensions - mm (inches)				
	A	B	C	D	E
SCN2-1A:333mV-0.4	61 (2.40")	42 (1.65")	29 (1.12")	10 (0.4")	10 (0.4")
SCN2-5A:333mV-0.4	61 (2.40")	42 (1.65")	29 (1.12")	10 (0.4")	10 (0.4")
SCN3-20A:333mV-0.7	78 (3.08")	60 (2.37")	29 (1.12")	18 (0.7")	18 (0.7")
SCN3-50A:333mV-0.7	78 (3.08")	60 (2.37")	29 (1.12")	18 (0.7")	18 (0.7")
SCN3-100A:333mV-0.7	78 (3.08")	60 (2.37")	29 (1.12")	18 (0.7")	18 (0.7")
SCN3-150A:333mV-0.7	78 (3.08")	60 (2.37")	29 (1.12")	18 (0.7")	18 (0.7")
SCN4-200A:333mV-1.25	83 (3.27")	81 (3.17")	35 (1.39")	32 (1.25")	32 (1.25")
SCN4-300A:333mV-1.25	83 (3.27")	81 (3.17")	35 (1.39")	32 (1.25")	32 (1.25")
SCN4-400A:333mV-1.25	83 (3.27")	81 (3.17")	35 (1.39")	32 (1.25")	32 (1.25")
SCN4-500A:333mV-1.25	83 (3.27")	81 (3.17")	35 (1.39")	32 (1.25")	32 (1.25")
SCN4-600A:333mV-1.25	83 (3.27")	81 (3.17")	35 (1.39")	32 (1.25")	32 (1.25")

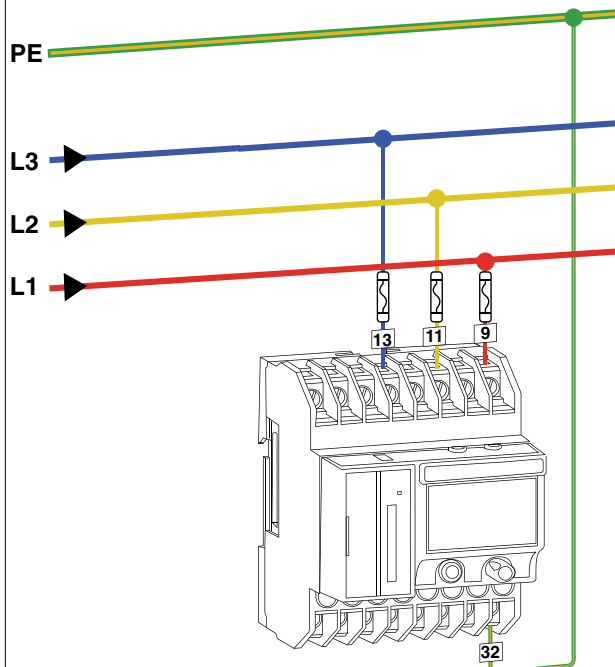
ORDERING INFORMATION

MODEL	DESCRIPTION	MODEL	DESCRIPTION
SCN2-1A:333mV-0.4	0.2% accuracy;1A:333mV; 0.4"X0.4"	SCN4-200A:333mV-1.25	0.2% accuracy;200A:333mV; 1.25"X1.25"
SCN2-5A:333mV-0.4	0.2% accuracy;5A:333mV; 0.4"X0.4"	SCN4-300A:333mV-1.25	0.2% accuracy;300A:333mV; 1.25"X1.25"
SCN3-20A:333mV-0.7	0.2% accuracy;20A:333mV; 0.7"X0.7"	SCN4-400A:333mV-1.25	0.2% accuracy;400A:333mV; 1.25"X1.25"
SCN3-50A:333mV-0.7	0.2% accuracy;50A:333mV; 0.7"X0.7"	SCN4-500A:333mV-1.25	0.2% accuracy;500A:333mV; 1.25"X1.25"
SCN3-100A:333mV-0.7	0.2% accuracy;100A:333mV; 0.7"X0.7"	SCN4-600A:333mV-1.25	0.2% accuracy;600A:333mV; 1.25"X1.25"
SCN3-150A:333mV-0.7	0.2% accuracy;150A:333mV; 0.7"X0.7"		

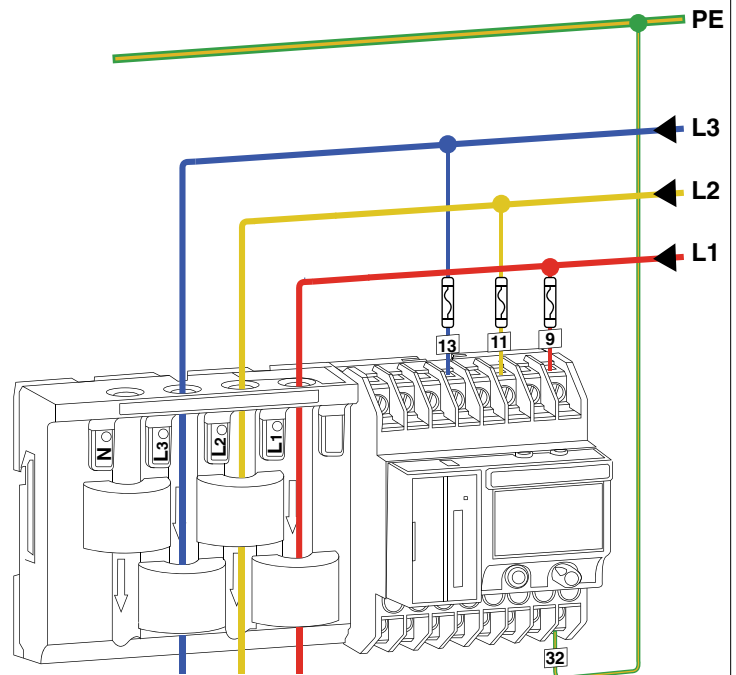
NEW!



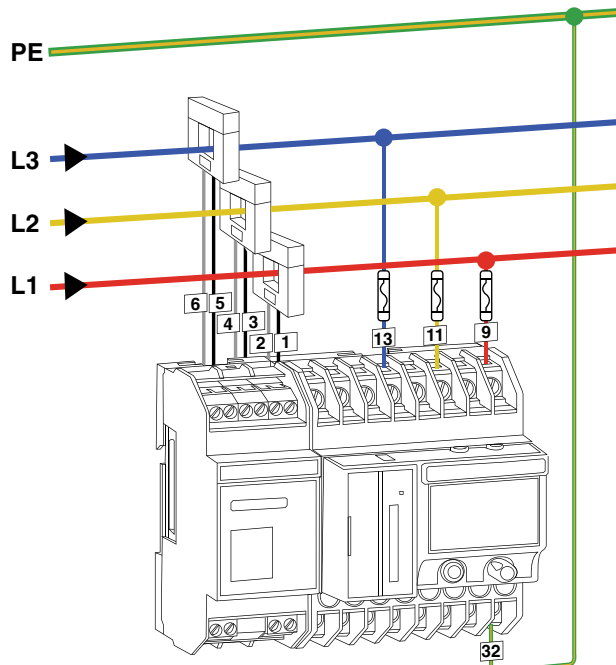
WIRING



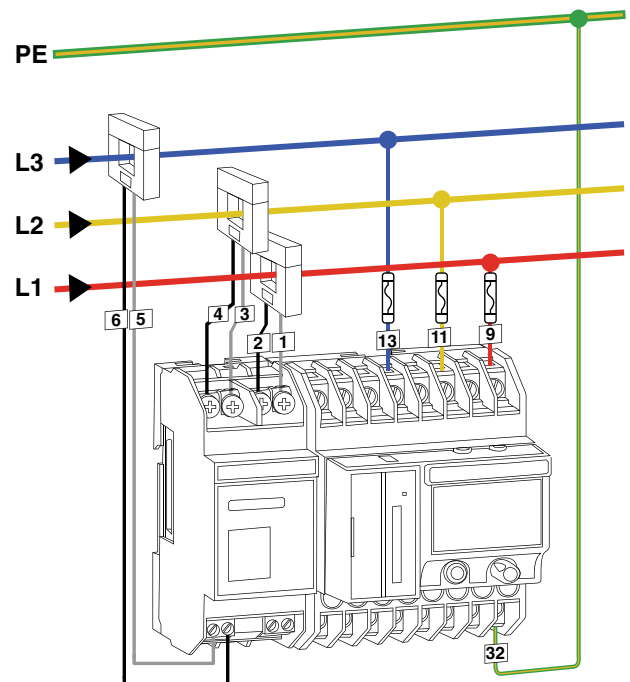
PQUBE MONITORS COMPLETE
VOLTAGE QUALITY



WITH CT4 CURRENT MODULE



WITH XCT5/CTE1 CURRENT MODULE, 3 CURRENT
TRANSFORMERS – PQUBE MEASURES CURRENT
ON ALL PHASES



WITH XCT4 CURRENT MODULE, 3 CURRENT TRANSFORMERS
– PQUBE MEASURES CURRENT ON ALL PHASES



POWER MONITORING & PROTECTION

TEMPERATURE/HUMIDITY PROBE

PQUBE TH SERIES, DC VOLTAGE MONITORS, DC SENSORS

DESCRIPTION

The **TH1** probe monitors ambient temperature and humidity. The PQube can now record temperature and humidity events with the addition of the probe. Every PQube accepts 2 electrically isolated probes. Use one for local conditions and the other on the optional 10 meter extension cable for monitoring remote conditions.

FEATURES

- **Temperature accuracy $\pm 0.5^{\circ}\text{C}$**
- **Max temp -4 to 176°F (-20 to 80°C)**
- **Humidity accuracy $\pm 4.5\%$ RH (20 - 80% RH) maximum $\pm 7.5\%$ 10 - 100% RH**
- **1.42×0.6 " ($3.61 \times 1.53\text{cm}$)**
- **0.4 lb (0.018 kg)**

NEW!



TH Series

PSI

CE



ORDERING INFORMATION

MODEL	DESCRIPTION
TH1-80C-00	TH1 temperature/humidity probe
THC-2M-00	Extension cable for TH180C-00; 2 meter length (6ft. 6.74")

DESCRIPTION

Compact **DC Voltage Attenuators** connect to PQube's analog channels. This can be used to monitor high voltage DC power. ATT1 models measure 1 differential voltage or 2 voltages relative to earth. ATT2 model measured DC voltage and DC current (with Hall effect sensors).

FEATURES

- **$\pm 600\text{VDC}$ or 1200VDC (CAT IV 300VAC)**
- **Terminals are standard shrouded safety banana jacks**
- **Shielded cables**
- **ATT1 = $4 \times 2 \times 1.5$ " ($10.2 \times 5.1 \times 3.8\text{cm}$)**
- **1.08 lb (0.49 kg)**
- **ATT2 = $5 \times 2.6 \times 1.2$ " ($12.7 \times 6.6 \times 3.0\text{cm}$)**
- **3.40 lb (1.54 kg)**

NEW!



ATT1



ATT2

PSI

ORDERING INFORMATION

MODEL	DESCRIPTION
ATT1-0600V-00	Voltage module $\pm 600\text{VDC}$ (CAT IV 300VAC)
ATT1-1200V-00	Voltage module $\pm 1200\text{VDC}$ (CAT IV 300VAC)
ATT2-0600V-00	Voltage/current module $\pm 600\text{VDC}$ (CAT IV 300VAC)
ATT2-1200V-00	Voltage/current module $\pm 1200\text{VDC}$ (CAT IV 300VAC)

DESCRIPTION

DC Hall Effect Sensors are for use with the **ATT2 Voltage / Current Modules**. They measure AC or DC current. 50A to 600A primary input to $\pm 4\text{V}$ output. They are powered from the DC output of the ATT2 module.

FEATURES

- **Measures AC or DC current**

NEW!



SCSDC-O-0050:4V CSDC-RCL0050:4V

PSI

cULus

ORDERING INFORMATION

MODEL	DESCRIPTION	MODEL	DESCRIPTION
CSDC-RCL0050:4V	DC current sensor, solid core, 50A:4V 0.81X0.41"	SCSDC-O-0050:4V	DC current sensor, split-core, 50A:4V 0.83" dia.
CSDC-RCL0100:4V	DC current sensor, solid core, 100A:4V 0.81X0.41"	SCSDC-O-0100:4V	DC current sensor, split-core, 100A:4V 0.83" dia.
CSDC-RCL0200:4V	DC current sensor, solid core, 200A:4V 0.81X0.41"	SCSDC-O-0200:4V	DC current sensor, split-core, 200A:4V 0.83" dia.
CSDC-RCL0400:4V	DC current sensor, solid core, 400A:4V 0.81X0.41"	SCSDC-O-0400:4V	DC current sensor, split-core, 400A:4V 0.83" dia.
CSDC-RCL0600:4V	DC current sensor, solid core, 600A:4V 0.81X0.41"	SCSDC-O-0600:4V	DC current sensor, split-core, 600A:4V 0.83" dia.

NEW!

POWER MONITORING & PROTECTION

WATTNODE AC POWER METER WNC SERIES



DESCRIPTION

WNC Series of AC Power measurement meters are available in pulse output or will support several communication protocol outputs. True power, kWh reactive power, VARs, power factor, and individual phase measurements. Diagnostic LEDs provide a per-phase indication of power (green flashing) and negative power (red flashing) to help troubleshoot connection problems such as swapped CT's or excessive live voltage. The meters use the safe Ct's producing 0.333 VAC at rated current. They have a small form factor for easy installation inside most electrical panels with pluggable screw terminals for easy wiring. Power Related Measurements - 50+ for BACnet and Modbus; 27+ for LonWorks.

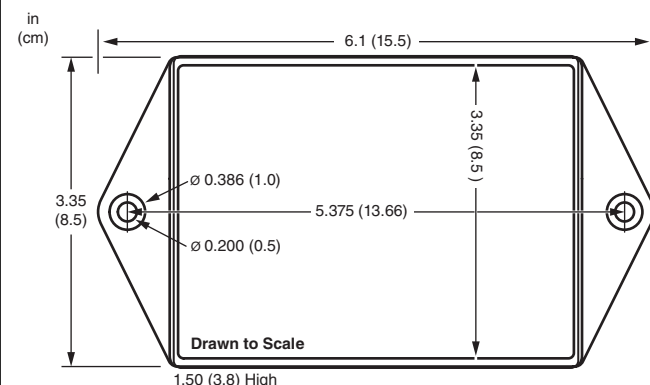
FEATURES

- **BACnet, Modbus, Lonworks or Pulse**
- **1 to 3 Phase 120VAC to 600VAC**
- **0.5% nominal accuracy (see manual for details)**
- **Euroblock style pluggable screw terminal blocks**
- **Line powered**
- **Uses safe current transformers; 0.333V output**
- **Bidirectional**

SPECIFICATIONS

Supply Voltage	120 to 600VAC
CT Input	0.333V nominal, 3V maximum
Operating Temperature	-22°F to 131°F (-30°C to 55°C)
Operating Humidity	5 to 90% RH up to 104°F (40°C)
Dimensions	6.1" x 3.35" x 1.5" (15.5 x 8.5 x 3.8 cm)
Weight	11oz.
RoHS Statement	Yes
Warranty	5 Years
Communication Protocol	BACnet MS/TP (RS-485)
Modbus RTU	
LonWorks Network Variables (SNVTs)	
Meets ARRA or BAA	Yes
Signal LEDs	Diagnostic LEDs Provide per-phase indication of power (green flashing) and negative power (red flashing) on BACnet, Modbus and Pulse models only
Approvals	CE, UL & cUL File #312220 FCC Class B, EN 55022 Class B
Additional Specifications	Assembled in the USA

DIMENSIONS



NEW!

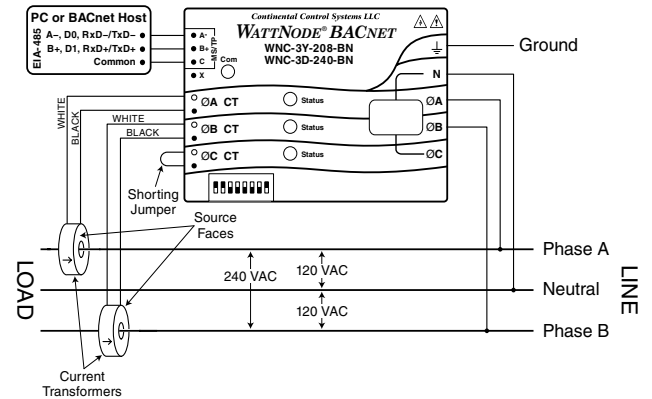
Continental Control Systems LLC



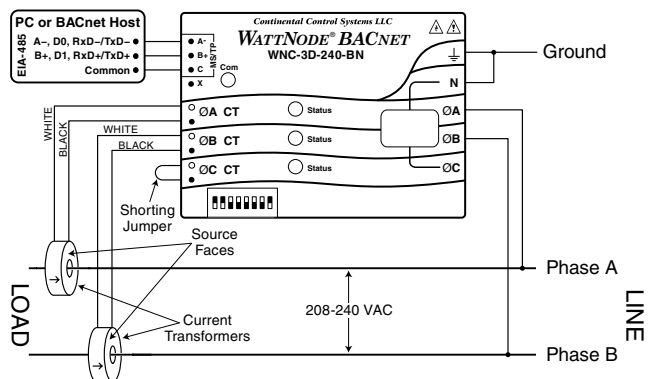
WNC Series



WIRING



Single Phase Three-Wire, Mid-Point Neutral Wire



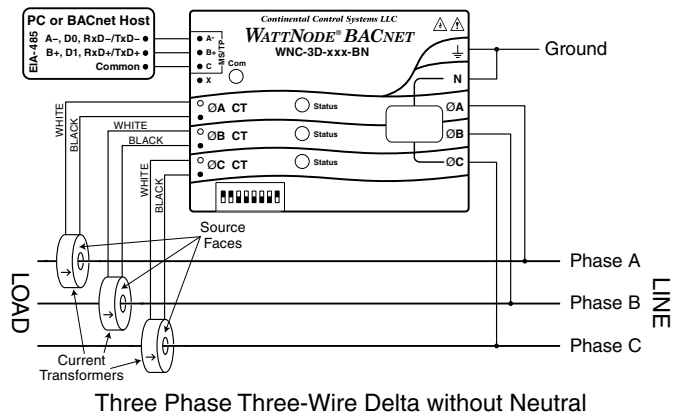
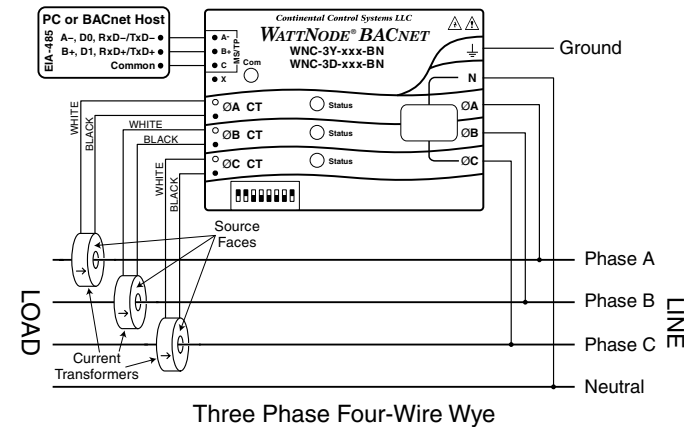
Single Phase Two-Wire without Neutral



POWER MONITORING & PROTECTION

WATTNODE AC POWER METER WNC SERIES

WIRING



ORDERING INFORMATION

MODEL	DESCRIPTION
WNC-3Y-208-BN	3 Phase 4 Wire 120V/208V BACnet
WNC-3Y-400-BN	3 Phase 4 Wire 230V/400V BACnet
WNC-3Y-480-BN	3 Phase 4 Wire 277V/480V BACnet
WNC-3Y-600-BN	3 Phase 4 Wire 347V/600V BACnet
WNC-3D-240-BN	3 Phase 3 Wire 120V/208V BACnet
WNC-3D-400-BN	3 Phase 3 Wire 230V/400V BACnet
WNC-3D-480-BN	3 Phase 3 Wire 277V/480V BACnet
WNC-3D-240-MB	3 Phase 3 Wire 120V/208V Modbus
WNC-3D-400-MB	3 Phase 3 Wire 230V/400V Modbus
WNC-3D-480-MB	3 Phase 3 Wire 277V/480V Modbus
WNC-3Y-400-MB	3 Phase 4 Wire 230V/400V Modbus
WNC-3Y-208-MB	3 Phase 4 Wire 120V/208V Modbus
WNC-3Y-480-MB	3 Phase 4 Wire 277V/480V Modbus
WNC-3Y-600-MB	3 Phase 4 Wire 347V/600V Modbus
WNC-3D-240-P	3 Phase 3 Wire 120V/208V Pulse
WNC-3D-400-P	3 Phase 3 Wire 230V/400V Pulse
WNC-3D-480-P	3 Phase 3 Wire 277V/480V Pulse
WNC-3Y-208-P	3 Phase 4 Wire 120V/208V Pulse
WNC-3Y-400-P	3 Phase 4 Wire 230V/400V Pulse
WNC-3Y-480-P	3 Phase 4 Wire 277V/480V Pulse
WNC-3Y-600-P	3 Phase 4 Wire 347V/600V Modbus
WNC-3Y-208-FT10	3 Phase 4 Wire 120V/208V LonWorks
WNC-3Y-400-FT10	3 Phase 4 Wire 230V/400V LonWorks
WNC-3Y-480-FT10	3 Phase 4 Wire 277V/480V LonWorks
WNC-3Y-600-FT10	3 Phase 4 Wire 347V/600V LonWorks
WNC-3D-240-FT10	3 Phase 3 Wire 120V/208V LonWorks
WNC-3D-400-FT10	3 Phase 3 Wire 230V/400V LonWorks
WNC-3D-480-FT10	3 Phase 3 Wire 277V/480V LonWorks

POWER MONITORING & PROTECTION

E50 SERIES POWER METER E50 SERIES



VERIS
INDUSTRIES

DESCRIPTION

The **E50 Series** power meter provides a solution for measuring energy data with a single device. Inputs include Control Power, CT, and 3-phase voltage. The **E50** supports multiple output options, including solid state relay contacts, BACnet, Modbus RTU (with or without data logging), and pulse. The LCD screen on the faceplate allows instant output viewing. The meter is housed in a plastic enclosure suitable for installation on T35 DIN rail according to EN50022. The **E50** can be mounted with any orientation over the entire ambient temperature range, either on a DIN rail or in a panel. The meter is not sensitive to CT orientation to reduce installation errors.

NEW!



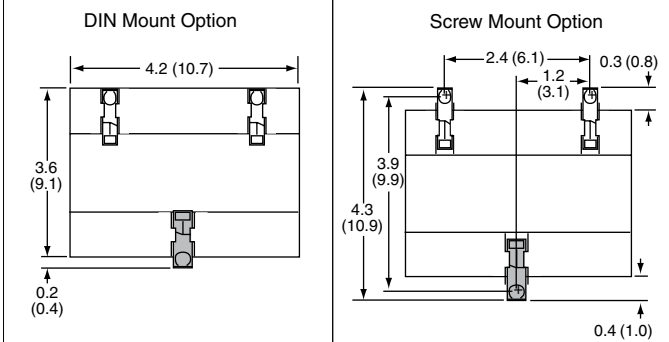
E50



FEATURES

- **Monitors 1, 2, or 3 phase services**
- **Monitors services up to 600 VAC directly and 32,000 VAC with use of a potential transformer**
- **Accepts .333 VAC or 1V Current Transformer's (sold separately)**
- **DIN mounting for easy installation**
- **ANSI 12.20 0.5% accuracy**
- **BACnet, Modbus RTU or pulse output**
- **90-600 VAC for application versatility**
- **Bright backlit LCD with easy visibility**
- **Pulse and phase loss alarms standard**
- **User-enabled password protection**
- **Approved for California Solar applications**

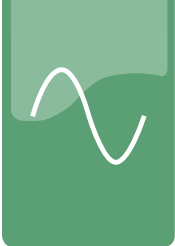
DIMENSIONS



SPECIFICATIONS

Supply Voltage UL	90 VAC (L-N) to 600 VAC (L-L), 50/60Hz	E50C2/E51C2	RS-485 2-wire, Modbus RTU Full Data Set,
CE	90 VAC (L-N) to 300 VAC (L-L), 50/60Hz, UL 90 VAC (L-N) to 600 VAC (L-L), 50/60Hz	E50C3/E51C3	RS-485 2-wire Modbus RTU Full Data Set, data logging,
Monitored Voltage Line to Line with Potential Transformer	601 to 32000 VAC	E50H3	RS-485 2-wire BACnet MS/TP Full Data Set, data logging
Monitored Current Current Transformer	5 to 32,000 Amps	Accuracy	Real power and energy 0.5% (ANSI C12.20, IEC 62053-22 Class 0.5S)
Input Input Signal	0 to 0.333V to 0 to 1 V 2 (E50H5 only) Pulse Solid-State or mechanical contacts (current less than 1 mA) Minimum Pulse Width 20 msec	Operating Temperature Meter:	-22° to 158°F (-30° to 70°C)
Outputs E50B1 E50C1	Reactive energy pulse 30 VAC/DC, RS-485 2-wire Modbus RTU Basic Data Set	Display:	14° to 122°F (-10° to 50°C)
		Operating Humidity	< 95% RH non-condensing
		Mounting	DIN Rail or 3-point screw mount
		Dimensions	2.3" x 4.2" x 3.6" (5.9 cm x 10.7 cm x 9.1 cm)
		Weight	0.62 lb (0.28 kg)
		Approvals	CE, UL508, File #E339785,
		RoHS Statement	Yes
		Warranty	5 years

NEW!

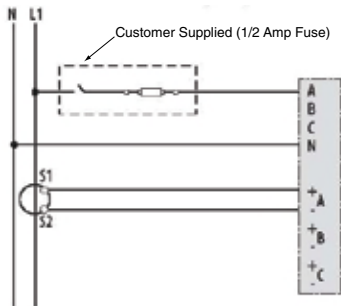


POWER MONITORING & PROTECTION

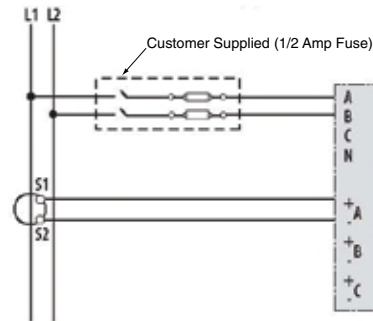
E50 SERIES POWER METER E50 SERIES

WIRING

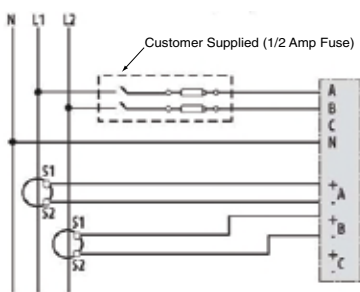
1-Phase Line-to-Neutral 2 - Wire System 1 CT



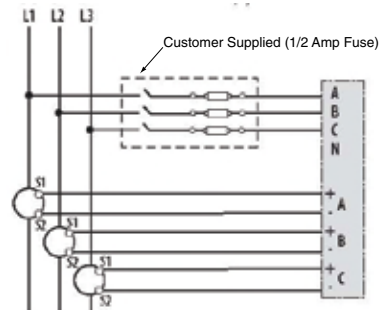
1-Phase Line-to-Line-Wire System 1 CT



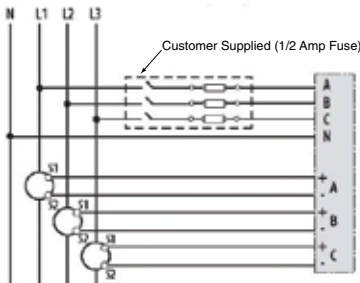
1-Phase Direct Voltage Connection 2 CT



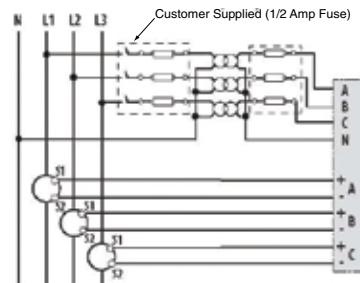
3-Phase 3-Wire 3 CT no PT



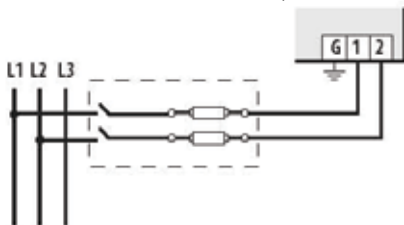
3-Phase 4-Wire Wye Direct Voltage Input Connection 3 CT



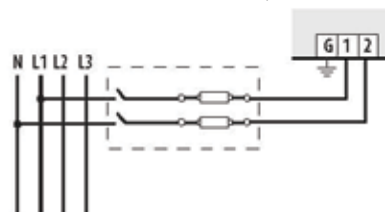
3-Phase 4-Wire Wye Connection 3 CT 3 PT



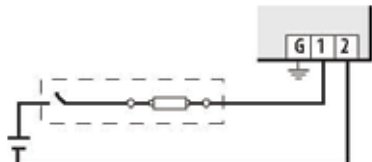
Direct Connect Control Power (Phase to Phase)



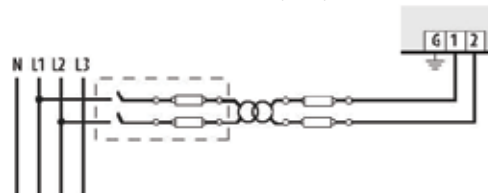
Direct Connect Control Power (Phase to Neutral)



Direct Connect Control Power (DC Control Power)



Control Power Transformer (CPT) Connection





BACNET/MODBUS DATA OUTPUTS

Basic Data Set (BDS):

Power (kW)
Energy (kWh)

(User configures which 10 data points are stored in these buffers)

User configurable logging interval (When configured for a 15 minute interval, each buffer holds 60 days of data)

Continuous and Single Shot logging modes: user selectable

Auto write pause: read logs without disabling the meter's data logging mode

Full Data Set (FDS) includes BDS plus:

Configurable for CT & PT ratios, system type, and passwords
Diagnostic alerts
Current: 3-phase average
Volts: 3-phase average
Current: by phase
Volts: by phase Line-Line and Line-Neutral
Power: Real, Reactive, and Apparent 3-phase total and per phase
Power Factor: 3-phase average and per phase
Frequency
Power Demand: Most Recent and Peak
Demand Configuration: Fixed, Rolling Block, and External Sync (Modbus only)

BACNET DATA LOGGING (includes all FDS outputs, plus):

Real Time Clock: uses BACnet Time

Synchronization services

3 BACnet log events: each buffer holds 5760 32-bit entries

(User configures which 3 data points are stored in these buffers)

User configurable logging interval, (When configured for a 15 minute interval, each buffer holds 60 days of data)

Continuous and single shot logging modes: user selectable

Auto write pause: read logs without disabling the meter's data logging mode

Data Logging (includes all FDS outputs, plus):

Real Time Clock: user configurable
10 user configurable log buffers: each buffer holds 5760 16-bit entries

ORDERING INFORMATION

MODEL

E51C2

E51C3

E50B1

E50C1

E50C2

E50C3

E50H5

DESCRIPTION

Power meter bi-directional, Modbus, pulse output

Power meter bi-directional, Modbus, pulse output, data logging

Pulse output only

Modbus output, basic data set

Modbus output, full data set

Modbus output, full data set, data logging

Power meter FDS BACnet, 2 pulse inputs, data logging

ACCESSORIES

AE010

AE011

AH02

AH03

AH04

Nema 4 enclosure for AE Series meters

Lock and key for AE010 enclosure

Fuse pack, 1 Phase

Fuse pack, 2 Phase

Fuse pack, 3 Phase



POWER MONITORING & PROTECTION

ADVANCED KWH/DEMAND METER H-SERIES CLASS 500 SUBMETERS

Honeywell

DESCRIPTION

The **H-Series Class 500 Submeters** come with enclosure, display, and does include split core current sensors. Available outputs include pulse, LonWorks, BACnet, BACnet IP, Modbus RTU, or Modbus TCP. There are 38 different points of information available on the communicating models. The dual protocol output allows operation for both RS-485 and Ethernet communication simultaneously. In addition, they will accept up to two pulse inputs from other meters (water, gas, sewer, etc.) and communicate this information as two more data points. Accuracy meets or exceeds +/- 0.5%.

FEATURES

- **Direct-read 8-digit LCD display of cumulative kWh**
- **Includes 0-2 volt output split-core current sensors**
- **Remote mounting of current sensors up to 500 feet from meter (using 22 Awg wire)**
- **Current sensor installation diagnostic indicator**
- **Available in standard JIC Industrial-grade steel enclosure**
- **UL Listed; meets or exceeds ANSI C12 national accuracy standards**
- **Optional power failure contact for alarming**
- **Dual protocol output**



H Series Class 500



SPECIFICATIONS

Voltage Input	Up to 600 VAC RMS available, 50/60Hz
Communication	Modbus RTU or TCP/IP BACnet IP or MS/TP LonWorks
Input Voltage Configuration	3-wire (Delta) or 4-wire (WYE)
CT Input	0-2 VDC current sensors included Sensors - Up to 3200 Amp RMS AC available
Available CT's	
Overload Rating	
Voltage Overload	+25% continuously; +100% for 20 cycles
Current Sensor Overload	100% for 1 minute without damaging meter Certified to ANSI C12.20
Accuracy Range	
(4 Wire Wye)	115/208 VAC: 100, 200, 400, 800, 1600, 3200 Amp
(4 Wire Wye)	277/480 VAC: 100, 200, 400, 800, 1600, 3200 Amp
(3 Wire Delta)	220/240 VAC: 100, 200, 400, 800, 1600, 3200 Amp
(3 Wire Delta)	480 VAC: 100, 200, 400, 800, 1600, 3200 Amp

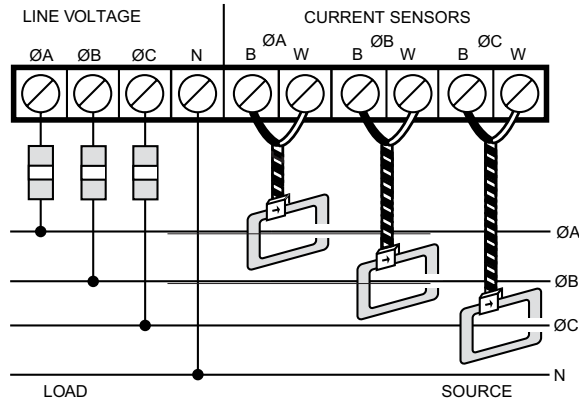
Operating Temperature	
NEMA 4	(Outdoor) Housing: -4° to 158°F (-20° to 70°C)
NEMA 12	(Indoor) Housing: -4° to 122°F (-20° to 50°C)
Operating Humidity	0 to 95% RH (non-condensing)
Housing Type	
Models with R	NEMA 4
Models without R	NEMA 12
Dimensions-Meter	7.5"H x 7"W x 3.75"D (19.1 x 17.8 x 8.3 cm)
Dimensions-Current Sensors Interior Window	
	100A and 200A = 7/8" x 1-1/2"
	400A = 1-1/2" x 2-3/4"
	800A and 1600A = 3-1/4" x 4-1/2"
	3200A = 5-7/16" x 7-7/8"
Approvals	UL file#E249361
Battery	
	Description Non-rechargeable cell used for memory retention
Manufacturer	Eagle-picher
Mfg Part No.	LTC-3PN
Working Voltage	3.5 Vdc
Current Capacity	350 mAhR
Electrolyte	Lithium thionyl nitrate
Warranty	1 year

POWER MONITORING & PROTECTION

ADVANCED KWH/DEMAND METER H-SERIES CLASS 500 SUBMETERS

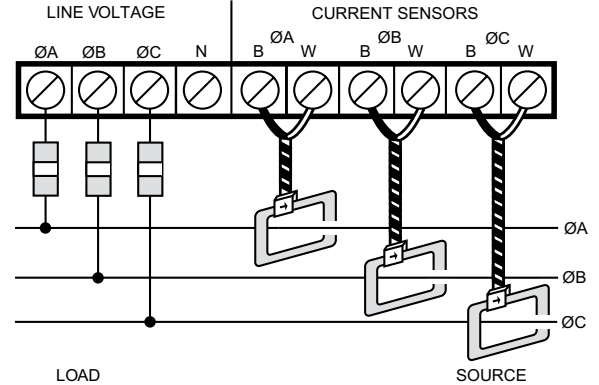


MAINS LINE VOLTAGE AND CURRENT SENSOR WIRING DIAGRAMS (CURRENT SENSORS INCLUDED)



NOTES: LINE VOLTAGE CONNECTIONS: 14-22 AWG
SENSOR CONNECTIONS: B=BLACK LEAD, W=WHITE LEAD
1/10A, 600 VAC INLINE FUSE PER CONDUCTOR.
LITTLEFUSE PART NUMBER KLDR 100.
NEUTRAL NOT USED IN DELTA SYSTEM. REMOVE NEUTRAL
TERMINAL BLOCK SCREW FOR DELTA SYSTEMS. M32788

3-phase, 4-wire installation diagram.



NOTES: LINE VOLTAGE CONNECTIONS: 14-22 AWG
SENSOR CONNECTIONS: B=BLACK LEAD, W=WHITE LEAD
1/10A, 600 VAC INLINE FUSE PER CONDUCTOR.
LITTLEFUSE PART NUMBER KLDR 100.
NEUTRAL NOT USED IN DELTA SYSTEM. REMOVE NEUTRAL
TERMINAL BLOCK SCREW FOR DELTA SYSTEMS. M32797

3-phase, 3-wire installation diagram.

ORDERING INFORMATION

MODEL	DESCRIPTION
H50-	H Series Class 500 Submeter
208	208V meter
480	480V meter
600	600V meter
100	100A input
200	200A input
400	400A input
800	800A input
1600	1600A input
3200	3200A input
J	Indoor use only
R	Outdoor use (NEMA 4x)
N	Green Net Option
02KIT	Modbus RTU and Ethernet EZ-7
03KIT	BACnet MS/TP and Ethernet
05KIT	BACnet IP and RS-485 EZ-7
06KIT	Modbus RCP/IP and Modbus RTU
07KIT	Lonworks and Ethernet EZ-7

H50- 480 100 J 03KIT **Example:** 480V, 100A meter, BACnet MS/TP and Ethernet

-or-

H50- 480 100 J N 03KIT **Example:** 480V, 100A Green Net meter, BACnet MS/TP and Ethernet EZ-7



POWER MONITORING & PROTECTION

CURRENT TRANSFORMERS WITH VOLTAGE OUTPUT

SCT SERIES

DESCRIPTION

The **SCT Series** of current transformers provides a low-voltage (0-0.333 V) output proportional to line current and is used in conjunction with the PowerTrak PT-9300 and the EnGenius to monitor electrical power systems. Often referred to as "Safe CTs," the mV output of these current transformers eliminates the need for shorting switches, and their split-core design makes them easy to install.

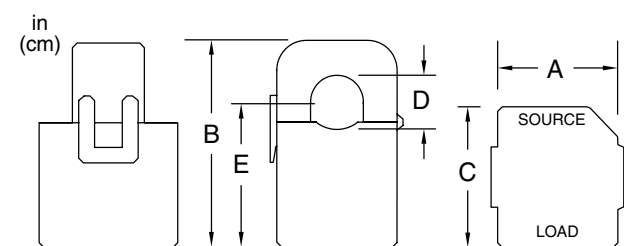
FEATURES

- Millivolt output (0-0.333V)
- Split-core design
- Low-cost
- No need for shorting switches

SPECIFICATIONS

Primary Current	5-3000A (see Ordering Information)
Secondary Voltage	0-0.333 VAC, 0% to 100% rated current
Frequency	50-400 Hz
Insulation Class	600V
Accuracy	±1%, (10% to 130% rated current)
Lead Wires	8' (2.44m) twisted pair leads, 22 AWG
Weight	1 lb (0.45 kg) maximum
Approvals	UL-recognized component, File #E96927 CE
RoHS Statement	Yes
Warranty	3 years

DIMENSIONS



DIMENSIONS		MODEL				
		SCT-0400	SCT-0750	SCT-1250	SCT-2000	SCT-3000
Window {	A	1.00 (1.54)	2.00 (5.1)	3.25 (8.25)	4.75 (12.07)	5.75 (14.6)
	B	1.55 (3.9)	2.10 (5.3)	3.35 (8.51)	5.00 (12.70)	7.50 (19.1)
	C	1.05 (2.7)	0.61 (1.5)	1.00 (2.54)	1.20 (3.05)	1.20 (3)
	D	0.40 (1.0)	0.75 (1.9)	1.25 (3.18)	2.00 (5.08)	3.00 (7.6)
	E	1.09 (2.8)	0.75 (1.9)	1.25 (3.18)	2.00 (5.08)	5.00 (12.7)

	RELATED PRODUCTS	PAGE
ENG-9000	Powertrak, 0.333 V input	913



SCT-0400



SCT-1250



SCT-2000



SCT-0750



ORDERING INFORMATION

MODEL	DESCRIPTION
SCT-0400-000	Split-core current transformer, 0.333V no burden resistor
SCT-0400-005	Split-core current transformer, 5A:0.333V
SCT-0400-010	Split-core current transformer, 10A:0.333V
SCT-0400-015	Split-core current transformer, 15A:0.333V
SCT-0400-020	Split-core current transformer, 20A:0.333V
SCT-0400-025	Split-core current transformer, 25A:0.333V
SCT-0400-030	Split-core current transformer, 30A:0.333V
SCT-0400-040	Split-core current transformer, 40A:0.333V
SCT-0400-050	Split-core current transformer, 50A:0.333V
SCT-0400-060	Split-core current transformer, 60A:0.333V
SCT-0400-075	Split-core current transformer, 75A:0.333V
SCT-0750-000	Split-core current transformer, no burden resistor
SCT-0750-005	Split-core current transformer, 5A:0.333V
SCT-0750-010	Split-core current transformer, 10A:0.333V
SCT-0750-020	Split-core current transformer, 20A:0.333V
SCT-0750-030	Split-core current transformer, 30A:0.333V
SCT-0750-050	Split-core current transformer, 50A:0.333V
SCT-0750-070	Split-core current transformer, 70A:0.333V
SCT-0750-0100	Split-core current transformer, 100A:0.333V
SCT-0750-0150	Split-core current transformer, 150A:0.333V
SCT-0750-0200	Split-core current transformer, 200A:0.333V
SCT-1250-000	Split-core current transformer, no burden resistor
SCT-1250-050	Split-core current transformer, 50A:0.333V
SCT-1250-100	Split-core current transformer, 100A:0.333V
SCT-1250-150	Split-core current transformer, 150A:0.333V
SCT-1250-200	Split-core current transformer, 200A:0.333V
SCT-1250-250	Split-core current transformer, 250A:0.333V
SCT-1250-300	Split-core current transformer, 300A:0.333V
SCT-1250-400	Split-core current transformer, 400A:0.333V
SCT-1250-600	Split-core current transformer, 600A:0.333V
SCT-2000-000	Split-core current transformer, no burden resistor
SCT-2000-100	Split-core current transformer, 100A:0.333V
SCT-2000-200	Split-core current transformer, 200A:0.333V
SCT-2000-400	Split-core current transformer, 400A:0.333V
SCT-2000-600	Split-core current transformer, 600A:0.333V
SCT-2000-800	Split-core current transformer, 800A:0.333V
SCT-2000-1000	Split-core current transformer, 1000A:0.333V
SCT-2000-1200	Split-core current transformer, 1200A:0.333V
SCT-2000-1500	Split-core current transformer, 1500A:0.333V
SCT-3000-000	Split core current transformer, no burden resistor
SCT-3000-400	Split-core current transformer, 400A:0.333V
SCT-3000-600	Split-core current transformer, 600A:0.333V
SCT-3000-800	Split-core current transformer, 800A:0.333V
SCT-3000-1000	Split-core current transformer, 1000A:0.333V
SCT-3000-1200	Split-core current transformer, 1200A:0.333V
SCT-3000-1500	Split-core current transformer, 1500A:0.333V
SCT-3000-2000	Split-core current transformer, 2000A:0.333V
SCT-3000-3000	Split-core current transformer, 3000A:0.333V

POWER MONITORING & PROTECTION

ROPECT AC CURRENT SENSOR RCT-1800 SERIES



DESCRIPTION

Magnelab's innovative RopeCT is based on the Rogowski principle of mutual inductance, which allows accurate measurement of AC current in a flexible medium. The resulting rope-like CT is highly accurate throughout its range and is easy to install by snaking it around parallel conductors or buswork. The RopeCT is both the ultimate in convenience and, often, the only solution to tough installation situations.

FEATURES

- Available in 250A to 5000A ratings
- Phase angle error < 0.5 degrees measured at 50% rated current
- 0-0.333 VAC safe output, no shorting switches required
- Eight-foot twisted pair leads
- One percent accuracy from 10 to 300 percent of rating



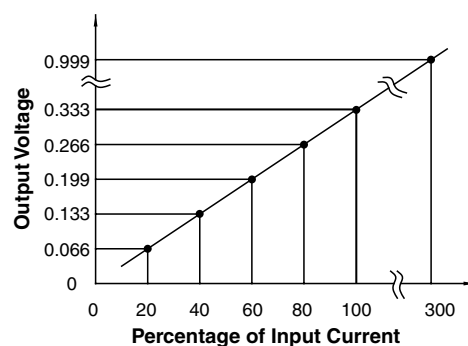
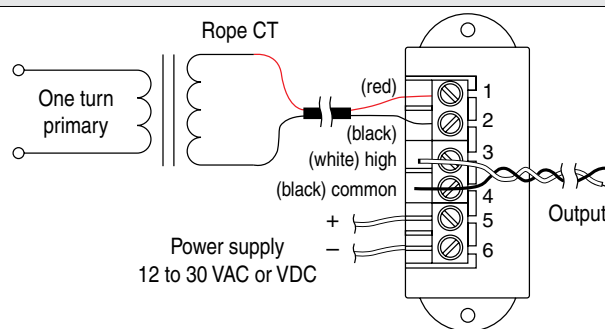
RCT-1800-1000



SPECIFICATIONS

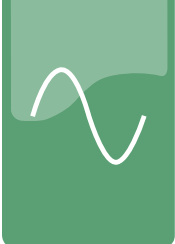
Supply Voltage	12 to 30 VAC/VDC
Primary Current	250A to 5000A
Secondary Voltage	0-0.333 V
Frequency	50 to 10,000 Hz
Insulation Class	600V
Accuracy	±1%
Lead Wires	8' twisted pair leads
Weight	0.4 lb (0.18 kg)
Rope Length	48"
Approvals	CE, UL recognized File #E96927
RoHS Statement	Yes
Warranty	1 year

WIRING



ORDERING INFORMATION

MODEL	DESCRIPTION
RCT-1800-0250	250A, 18-inch Rogowski coil flexible current sensor
RCT-1800-0500	500A, 18-inch Rogowski coil flexible current sensor
RCT-1800-1000	1000A, 18-inch Rogowski coil flexible current sensor
RCT-1800-2000	2000A, 18-inch Rogowski coil flexible current sensor
RCT-1800-3000	3000A, 18-inch Rogowski coil flexible current sensor
RCT-1800-4000	4000A, 18-inch Rogowski coil flexible current sensor
RCT-1800-5000	5000A, 18-inch Rogowski coil flexible current sensor



POWER MONITORING & PROTECTION

VOLTAGE DISCONNECT SWITCH BLOCK, CT SHORTING SWITCHES

U3889, 209PF

DESCRIPTION

The **Model U3889** Voltage Disconnect Switch Block provides a means for disconnecting power monitoring equipment. It provides isolation from line voltage and will short out and disconnect current transformer secondaries, preventing transformer damage that may occur when the circuit is opened under load. One side of the switch is connected to the circuits being measured; the other side of the switch is connected to the power monitoring equipment. The black plastic cover (**209PF**) is constructed so that all switches must be in the closed position before the cover can be sealed.

FEATURES

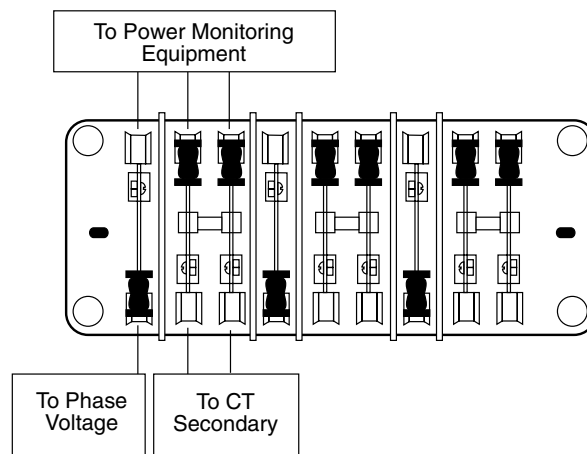
- Provides voltage disconnect and CT shorting/disconnect for power instrumentation
- Available in convenient metal screw cover enclosure
- Color-coded switch handles
- UL recognized

SPECIFICATIONS

Voltage Rating	600V
Current Rating	30 A
Dimensions	
Switch	9.5"L x 3.5"W x 2.75"D (24.1 x 8.9 x 7 cm)
Cover (209PF)	10.1"L x 4.6"W x 3.1"D (25.7 x 11.7 x 7.9 cm)
Optional enclosure	Metal screw cover box, NEMA 1 12"L x 10"W x 4"D (30.5 x 25.4 x 10.2 cm)
Weight	2.9 lb (1.3 kg) 3.5 lb (1.5 kg) with cover 11 lb (5 kg) with enclosure
Approvals	UL-recognized component, File #E109317
Warranty	Lifetime (normal use)



WIRING



Notes:

1. Red switch pulled up disconnects voltage.
2. Black switch pair pulled up shorts CT secondary and disconnects load from CT.

ORDERING INFORMATION

MODEL	DESCRIPTION
U3889-E	Switch block mounted in a 12" x 10" x 4" metal screw cover box
U3889	Switch block
209PF	Switch cover (not for use with U3889-E)



DESCRIPTION

Model 500T and 501T Split-Core Current Transformers provide a low-amperage current output proportional to line current and are for use in energy management control and metering applications. These transformers are ideal for use as inputs to power monitors such as the **EnGenius™** and current transducers such as Models 4CTV and 4CMA. These transformers are designed to be assembled around an existing insulated conductor without the need for dismantling the primary bus or cables. The portion of the transformers marked "This End Removable" can be disassembled and then reassembled around the conductors that require current monitoring.

FEATURES

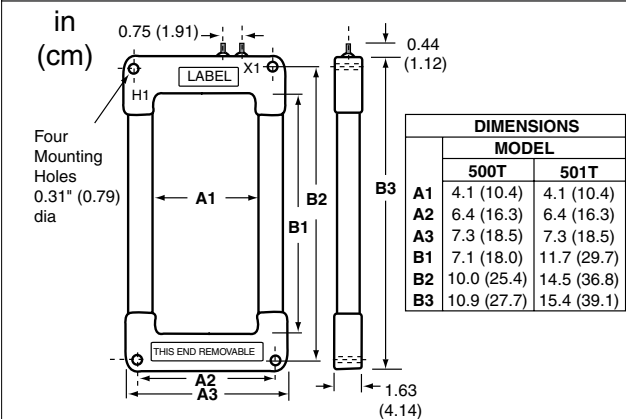
- **5A secondary**
- **Split-core construction for easy installation**
- **Brass stud terminals #8-32 with one flat washer, lockwasher, and regular nut**

CAUTION: Proper safety precautions must be followed by a trained electrician during installation. It is recommended that the incoming power be de-energized before installation. The current transformer must have its secondary terminals short-circuited or the burden (load) connected before energizing the primary circuit. For indoor use only. Use on insulated conductors only.



500T
(shown with end removed)

DIMENSIONS



SPECIFICATIONS

Secondary Frequency Terminations	0-5A 50-400 Hz Brass stud terminal with nut, flat washer, lockwasher
Materials Of Construction	Plastic, UL94V-1
Insulation Class	600V, 10 kV BIL
Continuous Thermal Current Resistor Factor	1.33 @ 30°C ambient (86°F) 1.0 @ 55°C ambient (131°F)

Window Size	4.1" x 7.1" (10.4 x 18.0 cm), 4.1" x 11.7" (10.4 x 29.7 cm)
Weight Approvals	8 lb (3.6 kg) UL-recognized component, File #E238872; CSA certified, File #245941
Warranty	1 year

ORDERING INFORMATION

MODEL 500T - 4.1" x 7.1" (10.4 x 18.0 cm) Window					
MODEL	CURRENT RATIO	ANSI METER CLASS @ 60Hz			ACCURACY CLASS WITH UNITY POWER FACTOR
		B0.1 2.5 VA	B0.2 5 VA	B0.5 12.5 VA	
500T-301	300:5	—	—	—	±5% @ 1.5 VA
500T-401	400:5	—	—	—	±3% @ 2.5 VA
500T-501	500:5	—	—	—	±2% @ 2.5 VA
500T-601	600:5	4.8	—	—	±1% @ 4.0 VA
500T-751	750:5	4.8	—	—	±1% @ 5.0 VA
500T-801	800:5	2.4	—	—	±1% @ 5.0 VA
500T-102	1000:5	2.4	4.8	—	±1% @ 7.5 VA
500T-122	1200:5	1.2	2.4	—	±1% @ 10.0 VA
500T-152	1500:5	1.2	1.2	2.4	±1% @ 12.5 VA
500T-162	1600:5	1.2	1.2	2.4	±1% @ 12.5 VA
500T-202	2000:5	0.6	1.2	2.4	±1% @ 15.0 VA
500T-252	2500:5	0.6	0.6	1.2	±1% @ 25.0 VA
500T-302	3000:5	0.6	0.6	1.2	±1% @ 25.0 VA
500T-402	4000:5	0.3	0.6	0.6	±1% @ 25.0 VA

MODEL 501T - 4.1" x 11.7" (10.4 x 29.7 cm) Window					
MODEL	CURRENT RATIO	ANSI METER CLASS @ 60Hz			ACCURACY CLASS WITH UNITY POWER FACTOR
		B0.1 2.5 VA	B0.2 5 VA	B0.5 12.5 VA	
501T-102	1000:5	2.4	4.8	—	±1% @ 7.5 VA
501T-122	1200:5	1.2	2.4	—	±1% @ 10.0 VA
501T-152	1500:5	1.2	1.2	2.4	±1% @ 12.5 VA
501T-202	2000:5	0.6	1.2	2.4	±1% @ 15.0 VA
501T-252	2500:5	0.6	0.6	1.2	±1% @ 25.0 VA
501T-302	3000:5	0.6	0.6	1.2	±1% @ 25.0 VA
501T-352	3500:5	0.6	0.6	0.6	±1% @ 25.0 VA
501T-402	4000:5	0.3	0.6	0.6	±1% @ 25.0 VA

Example: 500T-102 Split-core current transformer with a current ratio of 1000:5 and a window size of 4.1" x 7.1" (10.4 x 18.0 cm)

POWER MONITORING & PROTECTION

SPLIT-CORE CURRENT TRANSFORMERS

600T, 601T

DESCRIPTION

The **Model 600T** and **601T** Split-Core Current Transformers provide a low amperage current output proportional to line current. They are for use in energy management control and metering applications, and are ideal for use as inputs to power monitors like the **EnGenius™** and current transducers like Models 4CTV and 4CMA. These transformers are designed to be assembled around an existing insulated conductor without the need for dismantling the primary bus or cables. The portion of the transformers marked "This End Removable" can be disassembled and then reassembled around the conductors that require current monitoring.

FEATURES

- **5A secondary**
- **Split-core construction for easy installation**
- **Brass stud terminals #8-32 with one flat washer, lockwasher and regular nut**

SPECIFICATIONS

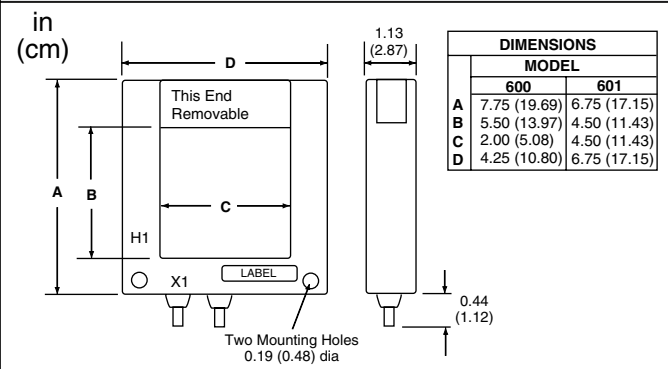
Secondary	0-5A
Frequency	50-400 Hz
Insulation Class	600V, 10 kV BIL Full Wave
Continuous Thermal Current Resistor Factor	1.33 @ 30°C (86°F) ambient 1.0 @ 55°C (131°F) ambient
Terminations	Brass stud terminals with nut, flat washer, lockwasher
Materials Of Construction	Plastic, UL94V-1
Window Size	2.0" x 5.5" (5.08 x 13.97 cm), 4.5" x 4.5" (11.43 x 11.43 cm)
Weight	1.5 lb (0.68 kg)
Approvals	UL-recognized component, File #E238872; CSA certified, File #245941
Warranty	1 year



601T
(shown with end removed)



DIMENSIONS



CAUTION: Proper safety precautions must be followed by a trained electrician during installation. It is recommended that the incoming power be deenergized before installation. The current transformer must have its secondary terminals short-circuited or the burden (load) connected before energizing the primary circuit. For indoor use only. Use on insulated conductor only.

ORDERING INFORMATION

MODEL 600T - 2.0" x 5.5" (5.1 x 14 cm) Window					
MODEL	CURRENT RATIO	ANSI METER CLASS @ 60 Hz			ACCURACY CLASS WITH UNITY POWER FACTOR
		B0.1 2.5 VA	B0.2 5 VA	B0.5 12.5 VA	
600T-401	400:5	2.4	4.8	--	± 1% @ 1.5 VA
600T-501	500:5	2.4	4.8	--	± 1% @ 2.0 VA
600T-601	600:5	2.4	2.4	--	± 1% @ 2.5 VA
600T-801	800:5	1.2	1.2	2.4	± 1% @ 5.0 VA
600T-102	1000:5	1.2	1.2	2.4	± 1% @ 7.5 VA
600T-122	1200:5	0.6	1.2	1.2	± 1% @ 15.0 VA
600T-162	1600:5	0.6	0.6	1.2	± 1% @ 20.0 VA
600T-202	2000:5	0.6	0.6	0.6	± 1% @ 30.0 VA
MULTI RATIO		CURRENT RATIO			
600T-122-801	1200/800:5				

MODEL 601T - 4.5" x 4.5" (11.4 x 11.4 cm) Window					
MODEL	CURRENT RATIO	ANSI METER CLASS @ 60 Hz			ACCURACY CLASS WITH UNITY POWER FACTOR
		B0.1 2.5 VA	B0.2 5 VA	B0.5 12.5 VA	
601T-301	300:5	--	--	--	± 1% @ 0.5 VA
601T-401	400:5	4.8	--	--	± 1% @ 1.0 VA
601T-501	500:5	4.8	4.8	--	± 1% @ 1.5 VA
601T-601	600:5	2.4	4.8	--	± 1% @ 2.0 VA
601T-801	800:5	1.2	2.4	4.8	± 1% @ 2.5 VA
601T-102	1000:5	1.2	1.2	4.8	± 1% @ 5.0 VA
601T-122	1200:5	1.2	1.2	2.4	± 1% @ 10.0 VA
601T-152	1500:5	1.2	1.2	1.2	± 1% @ 15.0 VA
601T-162	1600:5	1.2	1.2	1.2	± 1% @ 15.0 VA
601T-202	2000:5	0.6	0.6	1.2	± 1% @ 20.0 VA
MULTI RATIO		CURRENT RATIO			
601T-122-MR	1200/800/400:5				

Example: 601T-102 Split-core current transformer with a current ratio of 1000:5 and a window size of 4.5" x 4.5" (11.4 x 11.4 cm)

POWER MONITORING & PROTECTION

SOLID-CORE CURRENT TRANSFORMERS RL SERIES



DESCRIPTION

The **RL Series** Solid-Core Current Transformers provide a low-amperage current output proportional to line current and are for use in building automation and metering applications. These low-cost current transformers are ideal as inputs to power monitors, such as the EnGenius and current transducers, such as Models 4CTV and 4CMA.

FEATURES

- **5A secondary**
- **Flexible leads are UL 1015 105°C, CSA approved, #16 AWG, 24" L (61 cm)**
- **UL recognized component, CSA certified**



RL



SPECIFICATIONS

Secondary	0-5A
Frequency	50-400 Hz
Insulation Class	600V, 10 kV BIL, Full Wave
Lead Wires	24" (61 cm), 16 AWG
Materials Of Construction	Plastic, UL94V-1
Weight	
2RL	0.5 lb (0.23 kg)
5RL	1.0 lb (0.45 kg)
7RL	1.5 lb (0.63 kg)
8RL	2.5 lb (1.2 kg)
Approvals	UL-recognized component, File #E238872; CSA File #245941
Warranty	1 year

CAUTION: Proper safety precautions must be followed by a trained electrician during installation. It is recommended that the incoming power be de-energized before installation. The current transformer must have its secondary terminals short-circuited or the burden (load) connected before energizing the primary circuit. For indoor use only. Use on insulated conductors only.

ORDERING INFORMATION

CURRENT RATIO CODE	CURRENT RATIO	MODELS							
		MODEL 2RL		MODEL 5RL		MODEL 7RL		MODEL 8RL	
		Outer dia 2.46" (6.25 cm) Window dia 1.05" (2.67 cm)		Outer dia 3.56" (9.0 cm) Window dia 1.56" (3.9 cm)		Outer dia 4.58" (11.6 cm) Window dia 2.50" (6.4 cm)		Outer dia 5.73" (14.6 cm) Window dia 3.25" (8.3 cm)	
		Accuracy %	VA	Accuracy %	VA	Accuracy %	VA	Accuracy %	VA
500	50:5	±3	2.0	±2	1.0	--	--	--	--
750	75:5	±2	2.0	±2	1.5	--	--	--	--
101	100:5	±1	2.0	±2	2.0	±2	2.5	--	--
151	150:5	±1	4.0	±1	5.0	±1	5.0	--	--
201	200:5	±1	4.0	±1	5.0	±1	5.0	±1	5.0
251	250:5	±1	6.0	±1	10.0	±1	5.0	±1	7.5
301	300:5	±1	8.0	±1	12.5	±1	12.5	--	--
401	400:5	±1	10.0	±1	12.5	±1	15.0	±1	25.0
501	500:5	--	--	±1	20.0	±1	25.0	±1	35.0
601	600:5	--	--	±1	25.0	±1	30.0	±1	50.0
751	750:5	--	--	±1	25.0	±1	30.0	--	--
801	800:5	--	--	±1	25.0	±1	35.0	±1	60.0
102	1000:5	--	--	±1	25.0	±1	35.0	±1	75.0
122	1200:5	--	--	--	--	±1	35.0	--	--
162	1600:5	--	--	--	--	±1	45.0	--	--
202	2000:5	--	--	--	--	--	--	±1	120.0
252	2500:5	--	--	--	--	--	--	±1	50.0

5RL — **201**
Model Current
Ratio Code

Example: 5RL201 Model RL current transformer with 1.56" (3.9 cm) window diameter and a 200:5 current ratio

Important! Shaded items in Ordering Information are available by special order and are not returnable for credit.



POWER MONITORING & PROTECTION

SOLID CORE CURRENT TRANSFORMERS WITH VOLTAGE OUTPUT

UCT SERIES

DESCRIPTION

The **UCT Series** of solid core current sensors provide a low voltage (0.333V) output proportional to line current and is used in conjunction with the EnGenius power monitoring meter. These are often referred to as "safe", the mV output eliminates the need for shunting switches. The rugged epoxy encapsulated construction comes with 8-foot twisted leads.

FEATURES

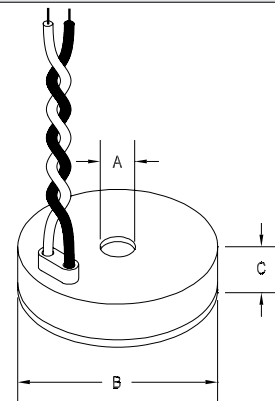
- **Rated input current from 5A to 400A**
- **Phase angle < 1° measured at 50% rated current**
- **8 ft. twisted-pair lead**
- **UL recognized**



SPECIFICATIONS

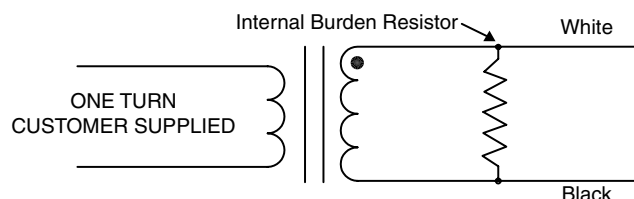
Primary	5A to 400A, 250A to 5000A
Secondary	0 - 0.333V, 0-0.333 V
Frequency	50 to 10,000 Hz
Insulation Class	600V
Accuracy	±1%; Accuracy at 10% to 130% of rated current
Lead Wires	8' twisted pair leads
Weight	0.4 lb (0.18 kg)
Approvals	CE, UL recognized File #E96927
RoHS Statement	Yes
Warranty	1 year

DIMENSIONS



Model	Dimensions (in)		
	A	B	C
UCT-0300	0.30	1.70	0.75
UCT-0500	0.50	1.90	0.75
UCT-0750	0.75	2.10	0.75
UCT-1000	1.00	2.40	0.80
UCT-1250	1.25	2.70	0.80

WIRING



ORDERING INFORMATION

MODEL

UCT-0300-005
UCT-1000-050
UCT-1250-100
UCT-1250-150
UCT-1250-200
UCT-1250-250
UCT-1250-300
UCT-1250-400

DESCRIPTION

Solid core current sensor 5A:0.333VAC
Solid core current sensor 50A:0.333VAC
Solid core current sensor 100A:0.333VAC
Solid core current sensor 150A:0.333VAC
Solid core current sensor 200A:0.333VAC
Solid core current sensor 250A:0.333VAC
Solid core current sensor 300A:0.333VAC
Solid core current sensor 400A:0.333VAC



CURRENT-OPERATED SWITCHES CS1A, CS1150A-LED, SCS1.5A, SCS1150A-LED

Kele

DESCRIPTION

The **Kele Models CS1A, SCS1.5A, CS1150A and SCS1150A** are solid-state switches that operate when the AC current level sensed by the internal current transformer exceeds a fixed or adjustable trip point. Internal circuits are totally powered by induction from the conductor being monitored. There is zero off-state leakage current in the solid-state relay output that can switch AC or DC circuits. The Smart LED indication option eliminates the need for meters when setting the adjustable trip point of the current switch. Solid-core and split-core models are available.



SCS1150A-LED



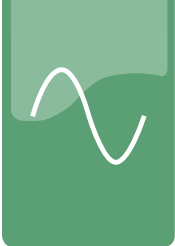
CS1150A-LED

FEATURES

- Models with fixed or adjustable trip point
- Switch AC or DC circuits
- Power and status LED
- Applicable for VFD applications down to 6Hz
- Powered by monitored line
- Available in solid-core models or split-core models that clamp easily around cables
- One-year warranty
- UL listed, CE certified



SPECIFICATIONS			
Frequency	6-100 Hz	Operating Temperature	-22° to 158°F (-30° to 70°C)
Switch Type	Normally open, solid state (SC250-NC is normally closed)	Mounting	3.5"L (8.9 cm) with 3.0" (7.6 cm) mounting centers
Rating	1-135 VAC/VDC, 0.3A (SC250-NC model 0.2A)	Dimensions	
Insulation Class	600V	CS1A, CS1150	1.9" x 3.45" x 1" (4.82 x 8.76 x 2.54 cm)
Trip Point		SCS1.5A, SCS1150A, SC250-NC	2.75" x 3.45" x 1.2" (6.98 x 8.76 x 3.04 cm)
CS1A	Fixed, 1A	Window Size	
SCS1.5A	Fixed, 1.25A	CS1A, CS1150	0.75" (1.9 cm) dia, for up to 250 MCM cable
CS1150A	Adjustable 1-200A	SCS1.5A, SCS1150A, SC250-NC	0.85" (2.2 cm) square aperture, for up to 350 MCM cable
SCS1150A, SC250-NC	Adjustable 1.25-200A	Weight	0.25 lb (0.11 kg)
Range		Approvals	UL listed, File #E320368 CE certified
CS1A, CS1150	1 - 200A, Jumper High	Warranty	1 year
SCS1.5A, SCS1150A, SC250-NC	1.25 - 200A, Jumper High		
Deadband	5% of setpoint		
Response Time	Less than 250 milliseconds		
Off State Leakage	< 25 mA		
Jumper			
None	= 0-100A		
Mid	= 0-150A		
High	= 0-200A		

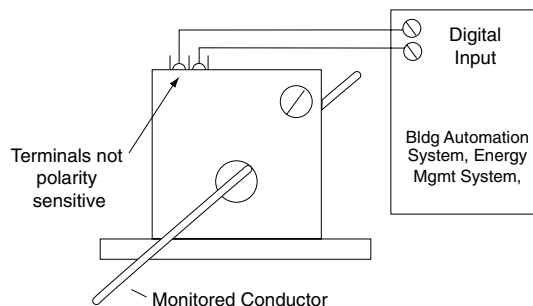
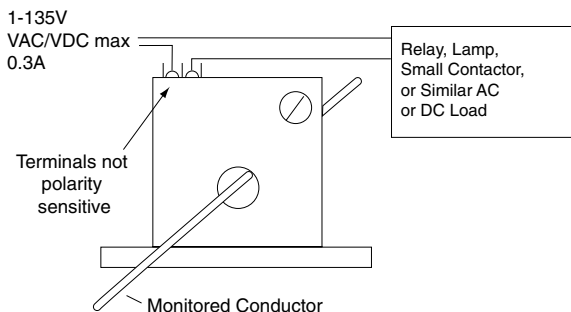


POWER MONITORING & PROTECTION

CURRENT-OPERATED SWITCHES

CS1A, CS1150A-LED, SCS1.5A, SCS1150A-LED

WIRING



INSTALLATION / ADJUSTMENT

Sensors can be mounted in any position or hung directly on wires. For larger mounting screws, drill out mounting holes. Use up to #14 AWG copper wire to terminals. Tighten to 7 in-lb torque.

Adjustment for CS1150A and SCS1150A

1. With the sensor wired as shown, use a voltmeter across the sensor contacts. A full voltage across the contact confirms the switch is open. Turn on the motor or other load being monitored.
2. The sensor is shipped with the multiturn adjustment set to the most sensitive position. If the sensor now operates, turn the adjustment counter-clockwise (CCW) until the operation reverses. The meter will indicate this action.
3. Now, turn the adjustment clockwise (CW) until the sensor just operates its controlled circuit. It is desirable to turn the adjustment slightly beyond this threshold point to provide a margin for normal current variations.

Status LED Indicator

1. **Light:** Sufficient current is **flowing** to opposite device.
2. **No light:** Current is either **OFF** or **below the bottom of the range**.

Application Notes

1. Make sure that switched current (connected to terminals) is limited to 0.3A continuous. Switched voltage should be no higher than 135 VAC/VDC.
2. **Important!** Monitoring excessive current can damage the sensor. Make sure monitored currents do not exceed maximum ratings.
3. For proper operation of the split-core model, make certain that the mating surfaces of the magnetic core are clean.

Troubleshooting

Problem

1. **Sensor does not switch at all, regardless of current level.**
2. **Adjustment has no stops; keeps turning.**

Probable Causes and Corrections

Adjustment pot is probably backed off completely, which disables the sensor. See Installation/Adjustment immediately above for instructions. Verify that mating surfaces of the split core are free of foreign particles. The multiturn adjustment pot has a slip-clutch that prevents damage at either end of its rotation.

ORDERING INFORMATION

MODEL

CS1A
SCS1.5A
CS1150A-LED
SCS1150A-LED
SC250-NC

DESCRIPTION

Solid-core current switch, fixed 1.0A trip, normally open
Split-core current switch, fixed 1.25A trip, normally open
Solid-core current switch, adjustable, normally open with LED
Split-core current switch, adjustable, normally open with LED
Split-core current switch, adjustable, normally closed with LED

POWER MONITORING & PROTECTION

CURRENT-OPERATED SWITCHES & TRANSDUCERS

RIBXG, RIBXK, RIBXK420 SERIES



DESCRIPTION

The **RIBXK, RIBXG, RIBXK420 Series** include both current-operated switches and current transducers. Solid-core and split-core current-operated switch models have a solid-state switch that operates when the current level sensed by the internal current transformer exceeds a fixed or adjustable set point. Solid-core current transducer models output a 4-20 mA signal proportional to the line current being monitored.

SPECIFICATIONS

RIBXK, RIBXG SERIES

Monitored AC Current

RIBXKF, RIBXKTF	0.25-150A
RIBXKA, RIBXKTA	0.5-150A
RIBXGF, RIBXGTF	0.35-150A
RIBXGA, RIBXGTA	0.75-150A

Switch Trip Point

RIBXKF, RIBXKTF	0.25A, fixed
RIBXKA, RIBXKTA	0.5-150A, adjustable
RIBXGF, RIBXGTF	0.35A, fixed
RIBXGFL, RIBXGTF	0.75A, fixed
RIBXGA, RIBXGTA	0.75-150A, adjustable

Switch Type

Solid state, normally open

Switch Rating

30 VAC/VDC, 0.4A maximum

Off State Leakage

<30 μ A @ 30 VAC/VDC

On State Voltage Drop

<0.3 VAC/VDC @ 0.1A
<1.6 VAC/VDC @ 0.4A

RIBXK420 SERIES

Supply Voltage

24 VDC

Output

4-20 mA, 30 mA maximum

Accuracy

\pm 5% FS

Linearity

\pm 1% FS

Output Impedance

600 Ω maximum @ 24 VDC

Input Range

20, 50, or 100A

General

Frequency

Suitable for most VFD applications

Maximum Sensed Voltage

600 VAC

Connections

16" (40.6 cm), 18 AWG, 600V wires
or terminals for 14-22 AWG

Operating Temperature

-30° to 140°F (-34.4° to 60°C)

Weight

0.3 lb (0.13 kg)

Approvals

UL listed, UL916, UL864 File #57312

RoHS Statement

Yes

Warranty

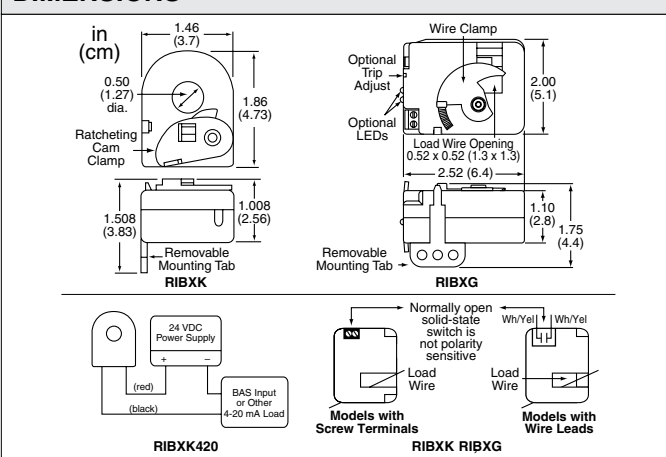
1 year



FEATURES

- **Solid- and split-core switch models have fixed (go/no go) or adjustable trip points**
- **Solid-core transducer models have a 4-20 mA output**
- **Low cost**
- **Ratcheting cam clamp to secure switch to wire**
- **Removable mounting tab**

DIMENSIONS



ORDERING INFORMATION

MODEL	DESCRIPTION
RIBXKF	Solid-core current-operated switch, wire leads, fixed-trip
RIBXKTF	Solid-core current-operated switch, terminals, fixed-trip
RIBXKA	Solid-core current-operated switch, wire leads, adjustable-trip
RIBXKTA	Solid-core current-operated switch, terminals, adjustable-trip
RIBXK420-20	Solid-core current transducer, 0-20A
RIBXK420-50	Solid-core current transducer, 0-50A
RIBXK420-100	Solid-core current transducer, 0-100A
RIBXGF	Split-core current-operated switch, fixed 0.35A trip, wire leads
RIBXGTF	Split-core current-operated switch, fixed 0.35A trip, terminal strip
RIBXGFL	Split-core current-operated switch, fixed 0.75A trip, wire leads, LEDs
RIBXGTF	Split-core current-operated switch, fixed 0.75A trip, terminal strip, LEDs
RIBXGA	Split-core current-operated switch, adjustable trip, wire leads, LEDs
RIBXGTA	Split-core current-operated switch, adjustable trip, terminal strip, LEDs



POWER MONITORING & PROTECTION

ACI CURRENT-OPERATED SWITCHES

A/ACS, A/ASCS, A/CS, A/SCS, A/CR SERIES

DESCRIPTION

The **ACI current switches** are solid-state devices that operate when the sensed AC current level exceeds a fixed or adjustable trip point. The **A/CS Series** is solid-core with a fixed trip point. The **A/SCS Series** is split-core with a fixed trip point. The **A/ACS Series** is solid-core with adjustable trip point. The **A/ASCS Series** is split-core with adjustable trip point. All models monitor either a 0-200 or 0-250 amp current flow in the wire and are available in normally-open or normally-closed configurations. The **A/CR Series** command relay brings control to monitoring applications.

FEATURES

- Available in solid or split-core
- Fixed or adjustable trip points
- Switches AC or DC circuits
- Status LED's
- Integral DIN rail mount
- Powered by monitored line
- Enclosure rated UL94-5VB
- Pilot duty rated (A/CR Series)



A/CS, A/ACS



A/CR-D-12A



A/SCS, A/ASCS



SPECIFICATIONS

Supply Voltage	Induced from monitored conductor	Operating Temperature	5° to 104°F (-15° to 40°C)
Frequency	40 Hz to 1 kHz	Operating Humidity	0 to 95% RH, (non-condensing)
Outputs		Mounting	DIN rail (35 mm), screw
Normally Open	0.3A @ 200 VAC/VDC	Window Size	0.75" (1.9 cm), accepts up to 350 MCM cables
Normally Closed	0.15A @ 300 VAC/VDC	Weight	0.21 lb (0.1 kg)
Isolation Rating	1270 VAC	Approvals	UL and cUL listed, file #E309723 and #E179139 CE
Insulation	600 VAC	RoHS Statement	Yes
LED Indication		Warranty	5 years, limited
Adjustable	Red = Above trip point Green = Below trip point		
Fixed Deadband	Red LED only 10% Setpoint		

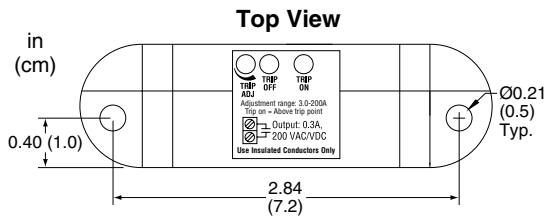
RELAY SPECIFICATIONS (COMMAND RELAY)

A/CR-DC-5A		A/CR-DC-12A		A/CR-12DC-12A	
Relay Type	Contact Rating	Relay Type	Contact Rating	Relay Type	Contact Rating
SPDT	5A @ 250 VAC General Use	SPDT	12A @ 250 VAC General Use	SPDT	12A @ 250 VAC General Use
Coil Voltage	5A @ 125 VAC Resistive	Coil Voltage	12A @ 125 VAC Resistive	Coil Voltage	12A @ 250 VAC Resistive
23-31.2 VDC	5A @ 30 VAC Resistive	20-31.2 VDC	12A @ 30 VAC Resistive	10-15.6 VDC	12A @ 30 VDC Resistive
Coil Current	1/4HP, 120/250/277 VAC	Coil Current	1/2HP, 120/250/480 VAC-NC	Coil Current	1/2HP, 120/240/480 VAC-NC
15mA @ 24 VDC	C 150 Pilot Duty	16mA @ 24 VDC	A300 Pilot Duty	30mA @ 24 VDC	A300 Pilot Duty
A/CR-24AC-10A		A/CR-115AC-8A		A/CR-230AC-8A	
Relay Type	Contact Rating	Relay Type	Contact Rating	Relay Type	Contact Rating
SPDT	10A @ 250 VAC General Use	SPDT	8A @ 250 VAC General Use	SPDT	8A @ 250 VAC General Use
Coil Voltage	10A @ 250 VAC Resistive	Coil Voltage	8A @ 250 VAC Resistive	Coil Voltage	8A @ 125 VAC Resistive
16-25.4 VAC	10A @ 30 VAC Resistive	80-132 VAC	8A @ 30 VAC Resistive	165-264 VAC	8A @ 30 VAC Resistive
Coil Current	1HP, 120/240/480 VAC-NO	Coil Current	1HP, 120/240/480 VAC-NO	Coil Current	1HP, 120/240/480 VAC-NO
28mA @ 24 VAC	1/2HP, 120/240/480 VAC-NO	10mA @ 115 VAC	1/2HP, 120/240/480 VAC-NC	5mA @ 230 VDC	1/2HP, 120/240/480 VAC-NC
	A300 Pilot Duty		A300 Pilot Duty		A300 Pilot Duty

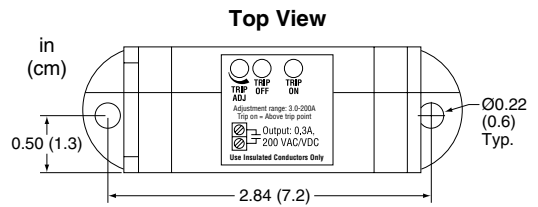


ACI CURRENT-OPERATED SWITCHES A/ACS, A/ASCS, A/CS, A/SCS, A/CR SERIES

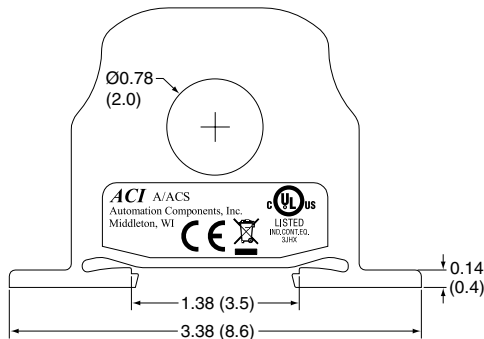
DIMENSIONS



A/ASCS only

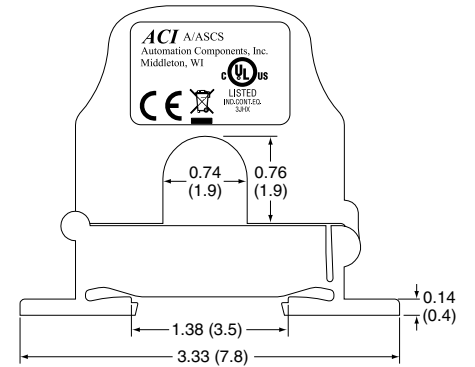


Front View

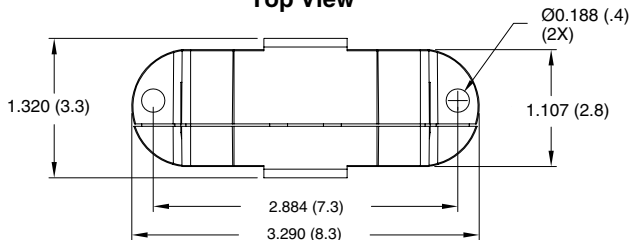


A/ASCS, A/SCS

Front View

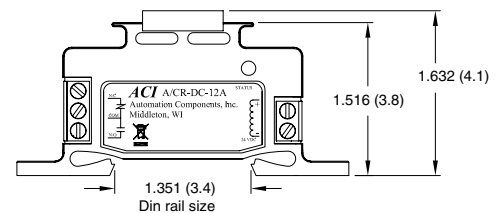


Top View



A/CR-CD-12A

Front View



ORDERING INFORMATION

MODEL	DESCRIPTION
A/CS	Solid-core current switch, 0.5A trip, normally-open, 0-250A range
A/CS-L	Solid-core current switch, 0.2A trip, normally-open, 0-250A range
A/CS-X	Solid-core current switch, 1A trip, normally-closed, 0-250A range
A/CS-X-L	Solid-core current switch, 0.5A trip, normally-closed, 0-250A range
A/ACS	Solid-core current switch, adjustable trip, normally-open, 1-250A range
A/ACS-L	Solid-core current switch, adjustable trip, normally-open, 0.5-250A range
A/ACSX	Solid-core current switch, adjustable trip, normally-closed, 1-250A range
A/SCS	Split-core current switch, 2.5A trip, normally-open, 0-200A range
A/SCS-L	Split-core current switch, 1.5A trip, normally-open, 0-200A range
A/SCSX	Split-core current switch, 2.5A trip, normally-closed, 0-250A range
A/ASCS	Split-core current switch, adjustable trip, normally-open, 3-200A range
A/ASCS-L	Split-core current switch, adjustable trip, normally-open, 2-200A range
A/ASCSX	Split-core current switch, adjustable trip, normally-closed, 3-250A range
A/ASCSX-L	Split-core current switch, adjustable trip, normally-closed, 2.5-250A range
A/CR-DC-5A	5 Amp SPDT relay, 23-31.2 VDC coil voltage
A/CR-DC-12A	12 Amp SPDT relay, 20-31.2 VDC coil voltage
A/CR-12DC-12A	12 Amp SPDT relay, 10-15.6 VDC coil voltage
A/CR-24AC-10A	10 Amp SPDT relay, 16-26.4 VAC coil voltage
A/CR-115AC-8A	8 Amp SPDT relay, 80-132 VAC coil voltage
A/CR-230AC-8A	8 Amp SPDT relay, 165-264 VAC coil voltage



POWER MONITORING & PROTECTION

ACI MINI CURRENT-OPERATED SWITCHES

A/MCS, A/MSCS, A/MCS-A, A/MSCS-A

DESCRIPTION

The **ACI Mini Current Switch** line has a normally-open, solid state contact that is non-polarity sensitive. They can be used to switch both AC and DC circuits up to 36 volts. The adjustable switches also include two status LED indicators that will indicate three states: tripped on, current present but below trip point, and current off or below the low end of the adjustable trip point range.

The **A/MCS** and **A/MSCS** current switches should be used in applications in which a go/no-go current status switch is required. A current status switch can be used to monitor fan and pump status, motors, compressors, and any other electrical equipment for on or off status. The **A/MCS-A** and **A/MSCS-A** adjustable current switches should be used in applications such as monitoring over and under loads, changes in the normal operating current or equipment status.

FEATURES

- *Go / no-go status switch*
- *Rated up to 150A*
- *5-year warranty*
- *UL94V-0 enclosure rating*
- *LED indication (adjustable models)*
- *Small size*



SPECIFICATIONS

Supply Voltage	Induced by monitored conductor
Frequency	50/60 Hz
Rating	
A/MCS, A/MSCS	0.5 A continuous 36 VAC/VDC
A/MCS-A, A/MSCS-A	0.5 A continuous 36 VAC/VDC
Insulation Class	600 VAC
Isolation Rating	2,200 VAC
LED Indication	
Red	Above trip point
Green	Below trip point
Trip Point	
A/MCS	Fixed 0.20A
A/MCS-A	0.32 - 150A
A/MSCS	Fixed 0.55A
A/MSCS-A	0.70 - 150A
Range	
A/MCS	0.20 - 150A
A/MCS-A	0.32 - 150A
A/MSCS	0.55 - 150A
A/MSCS-A	0.70 - 150A

Operating Temperature	-22° to 140°F (-30° to 60°C)
Operating Humidity	0 to 95% RH, (non condensing)
Dimensions	
A/MCS, A/MCS-A	2.50" x 1.96" x 0.95" (6.35 x 4.97 x 2.41 cm)
A/MSCS, A/MSCS-A	2.65" x 2.35" x 0.95" (6.73 x 5.08 x 2.43 cm)
Window Size	
A/MCS, A/MCS-A	0.55" (1.39 cm) dia., up to 1 AWG cables
A/MSCS, A/MSCS-A	0.53" (1.34 cm) dia., up to 1 AWG cables
Weight	0.21 lb (0.1 kg)
Approvals	UL and cUL, file #E309723, CE, UL94-5UB
RoHS Statement	Yes
Warranty	5 years

ORDERING INFORMATION

MODEL	DESCRIPTION
A/MCS	Solid-core, fixed current switch, N.O., 0-150A <0.20A
A/MCS-A	Solid-core, adjustable current switch, N.O., 0-150A 0.32 – 150A
A/MSCS	Split-core, fixed current switch, N.O., 0-150A <0.55A
A/MSCS-A	Split-core, adjustable current switch, N.O., 0-150A 0.70 – 150A

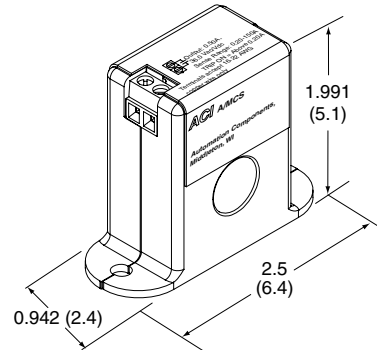
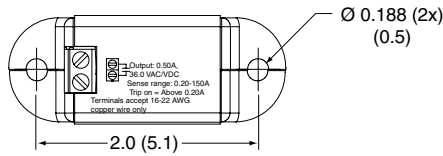


ACI MINI CURRENT-OPERATED SWITCHES A/MCS, A/MSCS, A/MCS-A, A/MSCS-A

DIMENSIONS

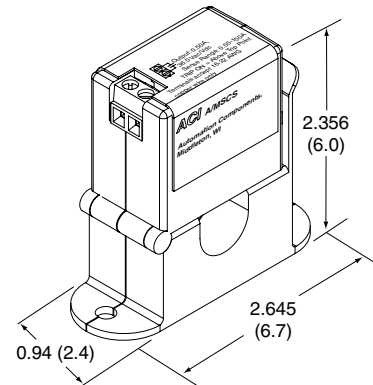
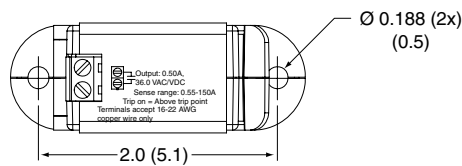
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(cm)

Solid Core

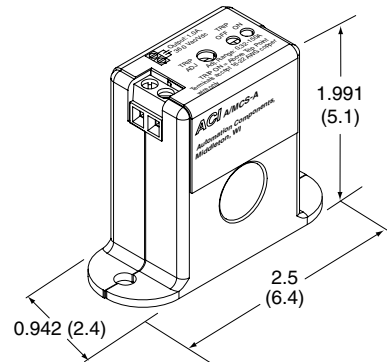
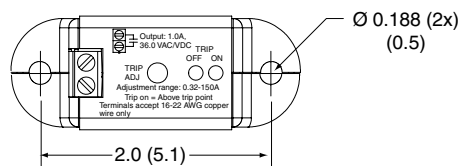


A/MCS
A/MSCS

Split Core

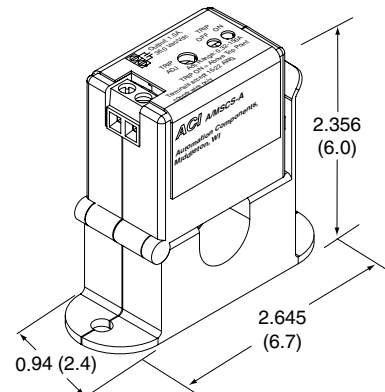
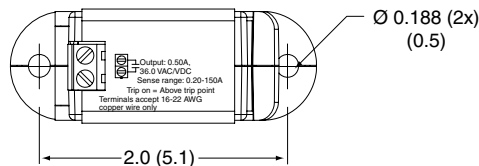


Solid Core



A/MCS-A
A/MSCS-A

Split Core





POWER MONITORING & PROTECTION

FUNCTIONAL DEVICES CURRENT SWITCH AND RELAY

RIBX SERIES

DESCRIPTION

The Relay in a Box **RIBX Series** provides a unique and cost-effective solution to on/off motor control and current sensing status indication. Combined in a single, convenient junction box with high- and low-voltage separation are a control relay and a current sensing status switch. A three-position closed/open/auto switch is available to override the output of the relay. This versatile product allows both control and status sensing of electrical loads by a BAS, all in a self-contained, easy-to-install housing.

FEATURES

- *Cost-effective current sensing with a control relay*
- *Self-contained housing with high and low voltage separation*
- *LED indication of relay and current sensor trip*
- *Optional relay contact override switch*
- *Plenum-rated housing*
- *UL and ULC listed for UL 916 Energy Management and UL 864 Fire*

Functional
Devices, Inc.

RIBX



RIBX Solid-Core
Remote Current
Sensing



RIBX Internal
Current Sensing



RIBX Split-Core
Remote Current
Sensing



SPECIFICATIONS

Frequency	50/60 Hz
Switch Rating	30 VAC/VDC @ 0.4A maximum
LED Indication	
LED#1	ON Relay activated
LED#2	ON Current trip point exceeded
Response Time	20mS
Relay	
Life Rating	10 million cycles minimum mechanical
Coil Pull In Voltage	
10-30 VAC/VDC models	9 VAC, 10 VDC
24 VAC/VDC models	18 VAC, 22 VDC
Coil Drop Out Voltage	
10-30 VAC/VDC models	2.1 VAC, 2.8 VDC
24 VAC/VDC models	3 VAC, 3.8 VDC
Off State Leakage	< .03 mA @ 30 VAC/VDC

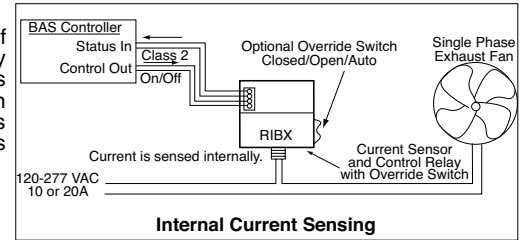
On State Voltage Drop	<0.3 VAC/VDC @ 0.1A <1.6 VAC/VDC @ 0.4A
Lead Wires	16" (40.6 cm) 600V Rated
Operating Temperature	-30° to 140°F (-34° to 60°C)
Operating Humidity	5 to 95% (non-condensing)
Dimensions	
Enclosure	4"H x 4"W x 1.8"D (10.2 x 10.2 x 4.6 cm), NEMA 1 with 1/2" NPT
Solid Core	1.86" x 1.46" (3 x 3.71 cm)
Split Core	2.52" x 2.0" (6.4 x 5.08 cm)
Window Size	
Solid Core	0.5" (1.27 cm)
Split Core	0.52" x 0.52" (1.32 x 1.32 cm)
Weight	1 lb (0.45 kg)
Approvals	UL and cUL listed, File #E68805 (UL 916) and #S7312 (UL 864)
RoHS Statement	Yes
Warranty	1 year



APPLICATION

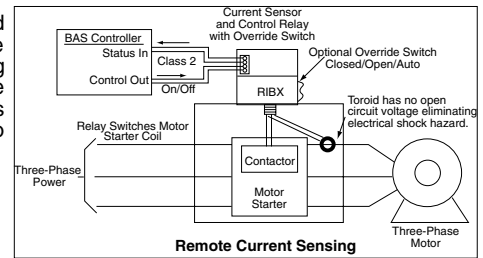
Internal Current Sensing (for single-phase loads)

Models with internal current-sensing are great for direct-control and current-sensing of exhaust fans, pumps, and other single-phase electrical loads up to 20A. The control relay contacts of these models wire directly in series with single-phase motors using the wires that exit the housing through the 1/2" conduit hub. The current of the load is sensed within the housing. Low-voltage wiring from the controller for the control relay coil and status switch enter the separate Class 2 wiring compartment in the housing through star bushings or conduit and are connected to screw terminals.



Remote Current Sensing (for loads with motor starters)

Models with remote current-sensing are great for control and status sensing of electrical loads that require a motor starter. The control relay contacts of these models are wired in series with the motor starter coil using the two wires that exit the housing through the 1/2" conduit hub. Currents up to 150A are sensed externally with a current sensing ring connected to the two gray wires that also exit through the 1/2" conduit hub. Low-voltage wiring from the controller for the control relay coil and status switch enter the separate Class 2 wiring compartment in the housing through star bushings or conduit and are connected to screw terminals.



ORDERING INFORMATION

MODEL	CURRENT SENSING	CURRENT SENSING RANGE/THRESHOLD	OVER SW	RELAY CONTACT RATINGS *	RELAY CONTACT WIRING	RELAY COIL AND CURRENT SWITCH
RIBXLC A	Internal	0.5-10A/Adjustable	—	10A resistive	1-SPDT Relay (blue) — N.C. (yellow) — COM (orange) — N.O.	Relay input current 33 mA @ 10 VAC 13 mA @ 10 VDC 35 mA @ 12 VAC 15 mA @ 12 VDC 46 mA @ 24 VAC 18 mA @ 24 VDC 55 mA @ 30 VAC 20 mA @ 30 VDC Relay coil wiring 10-30 VAC/VDC Common Current switch wiring Current Sensor Status
RIBXLC E A		0.125-5A/Adjustable		480 VA pilot duty		
RIBXLC F		0.5-10A/Fixed, 0.5A		480 VA ballast		
RIBXLC J A	Split-core	3-150A/Adjustable	—	600W tungsten	1-SPDT Relay (orange) — Closed (orange) — Open (orange) — Auto	Relay input current 50 mA @ 18 VAC 33 mA @ 22 VDC 83 mA @ 24 VAC 35 mA @ 24 VDC 47 mA @ 30 VDC Relay coil wiring 24 VAC/VDC Common Current switch output Current Sensor Status
RIBXLC J F		3-150A/Fixed, 3A		240W tungsten		
RIBXLC R A	Solid-core	1.25-150A/Adjustable	—	120 VAC N.C.	1-SPDT Relay (orange) — Closed (orange) — Open (orange) — Auto	Relay input current 210 mA @ 24 VAC 154 mA @ 30 VDC Relay coil wiring 24 VAC/VDC Common Current switch output Current Sensor Status
RIBXLC R F		1.25-150A/Fixed, 1.25A		120 VAC N.C.		
RIBXLS A	Internal	0.5-10A/Adjustable	Yes	10A resistive	1-SPDT Relay (orange) — Closed (orange) — Open (orange) — Auto	Relay input current 210 mA @ 24 VAC 154 mA @ 30 VDC Relay coil wiring 24 VAC/VDC Common Current switch output Current Sensor Status
RIBXLS E A		0.125-5A/Adjustable		277 VAC		
RIBXLS F		0.5-10A/Fixed, 0.5A		277 VAC		
RIBXLS J A	Split-core	3-150A/Adjustable	—	480 VA ballast	1-SPDT Relay (orange) — Closed (orange) — Open (orange) — Auto	Relay input current 210 mA @ 24 VAC 154 mA @ 30 VDC Relay coil wiring 24 VAC/VDC Common Current switch output Current Sensor Status
RIBXLS J F		3-150A/Fixed, 3A		277 VAC		
RIBXLS R A	Solid-core	1.25-150A/Adjustable	—	120 VAC N.C.	1-SPDT Relay (orange) — Closed (orange) — Open (orange) — Auto	Relay input current 210 mA @ 24 VAC 154 mA @ 30 VDC Relay coil wiring 24 VAC/VDC Common Current switch output Current Sensor Status
RIBXLS R F		1.25-150A/Fixed, 1.25A		277 VAC		
RIBX24 B A	Internal	0.5-20A/Adjustable	—	20A resistive	1-SPDT Relay (blue) — N.C. (yellow) — COM (orange) — N.O.	Relay input current 210 mA @ 24 VAC 154 mA @ 30 VDC Relay coil wiring 24 VAC/VDC Common Current switch output Current Sensor Status
RIBX24 B F		0.5-20A/Fixed, 0.5A		277 VAC		
RIBX24 S B A	Internal	0.5-20A/Adjustable	Yes	1110 VA pilot duty	1-SPDT Relay (orange) — Closed (orange) — Open (orange) — Auto	Relay input current 210 mA @ 24 VAC 154 mA @ 30 VDC Relay coil wiring 24 VAC/VDC Common Current switch output Current Sensor Status
RIBX24 S B F		0.5-20A/Fixed, 0.5A		277 VAC		
RIBX243 P A	Internal	0.5-20A/Adjustable	—	20A ballast	1-SPDT Relay (blue) — N.C. (yellow) — COM (orange) — N.O.	Relay input current 210 mA @ 24 VAC 154 mA @ 30 VDC Relay coil wiring 24 VAC/VDC Common Current switch output Current Sensor Status
RIBX243 P F		0.5-20A/Fixed, 0.5A		277 VAC		
RIBX F	Internal	0.5-30A/Fixed, 0.5A	—	10A tungsten	Current Sensor Wiring Internal Models Current Sensor (purple) Solid- and split-core models Current Sensor (gray)	Current switch wiring Current Sensor Status
RIBX A	Internal	0.5-30A/Adjustable	—	240W tungsten		
RIBX R F	Solid-core	1.25-150A/Fixed, 1.25A	—	1 hp		
RIBX R A	Solid-core	1.25-150A/Adjustable	—	2 hp		
RIBX J F	Split-core	3-150A/Fixed, 3A	—	1 hp		
RIBX J A	Split-core	3-150A/Adjustable	—	1 hp		

Note: ⚠ Internal yellow jumper determines if SPST contacts are N.O. or N.C. ⚠ Can be ordered N.C. by adding **-NC** after model number.
 * Not rated for electronic ballast.



POWER MONITORING & PROTECTION

KELE AC CURRENT TRANSDUCER

4CTV, 4CMA

DESCRIPTION

Models 4CTV and 4CMA are AC amperage-to-analog DC transducers that can be used to directly monitor loads of up to 20A. For loads of 20-5000A, an external current transformer can be used. Developed for building automation and energy management, the **Model 4CTV** converts an AC current to a 0-5 VDC voltage and the **Model 4CMA** converts an AC current to a 4-20 mA current that can be monitored by any processor that accepts analog DC voltage or current.

FEATURES

- **4CTV** requires no external power supply
- Rugged design to withstand momentary AC inrushes of 120A (6x rating)
- Easy to install, only two connections
- 50/60 Hz operation

APPLICATION

- AC current input to DC voltage or milliamp output
- Monitoring of AC current of motors, lighting, heating, industrial processes, etc.
- Monitoring of chiller loads using existing current transformers



4CTV



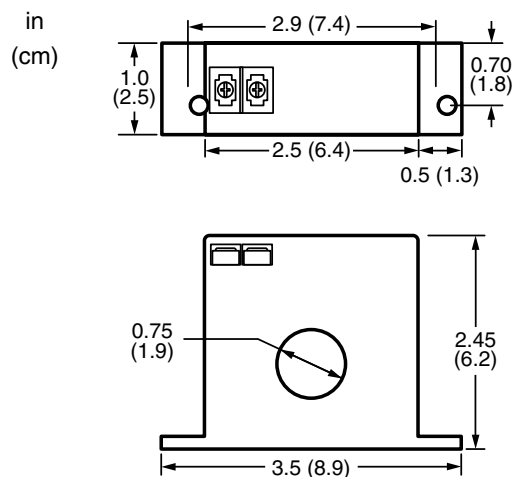
4CMA



SPECIFICATIONS

Supply Voltage	
4CMA	24 VDC
4CTV	Induced by monitored conductor
Inputs	
0-20A (change jumper to 0 to 50A)	
Outputs	
4CMA	4-20 mA, 600Ω maximum load
4CTV	0-5 VDC, 30 kΩ minimum load
Insulation Class	
600V	
Ripple	
<2% FS	
Accuracy	
±1% FS (24 VDC @ 25°C)	
Operating Temperature	
-22° to 158°F (-30° to 70°C)	
Dimensions	
2.9" x 1" x 2.45"	
(7.4 x 2.5 x .62 cm)	
Weight	
0.25 lb (0.11 kg)	
Approvals	
UL File# E320368, CE, RoHS	
RoHS Statement	
Yes	
Warranty	
1 year	

DIMENSIONS

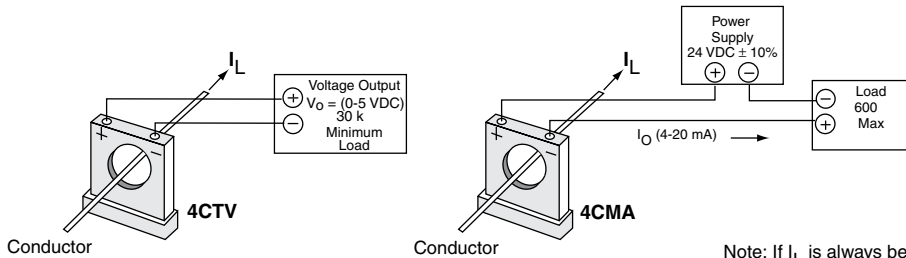


Solid-Core



WIRING

APPLICATION #1. Monitoring Loads Under 20A



Note: If I_L is always below 10A, multiple passes of the conductor will improve scaling. The sum of these amperages must remain below 20A.

4CTV Formula:

$$I_L \text{ (load amps)} = \frac{20}{\text{turns}} \times \left(\frac{V_o}{5} \right)$$

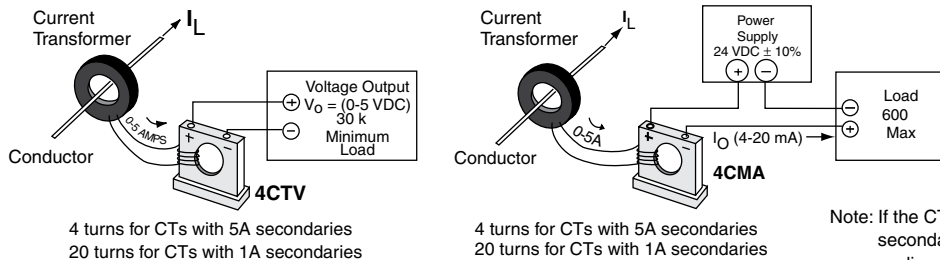
V_o = VDC from 4CTV
 turns = number of times conductor passes through 4CTV

4CMA Formula:

$$I_L \text{ (load amps)} = \frac{20}{\text{turns}} \times \left(\frac{I_o - 4}{16} \right)$$

I_o = mA DC from 4CMA
 turns = number of times conductor passes through 4CMA

APPLICATION #2. Monitoring Loads Over 20A with a Current Transformer



4 turns for CTs with 5A secondaries
 20 turns for CTs with 1A secondaries

4 turns for CTs with 5A secondaries
 20 turns for CTs with 1A secondaries

Note: If the CT is oversized, multiple conductor passes or more secondary turns through the 4CTV or 4CMA will improve scaling. The CT output should not exceed 5A or the CT secondary turns should not total more than 20A.

4CTV Formula:

$$I_L \text{ (load amps)} = \frac{\text{CT primary rating}}{\text{rating}} \times \left(\frac{V_o}{5} \right)$$

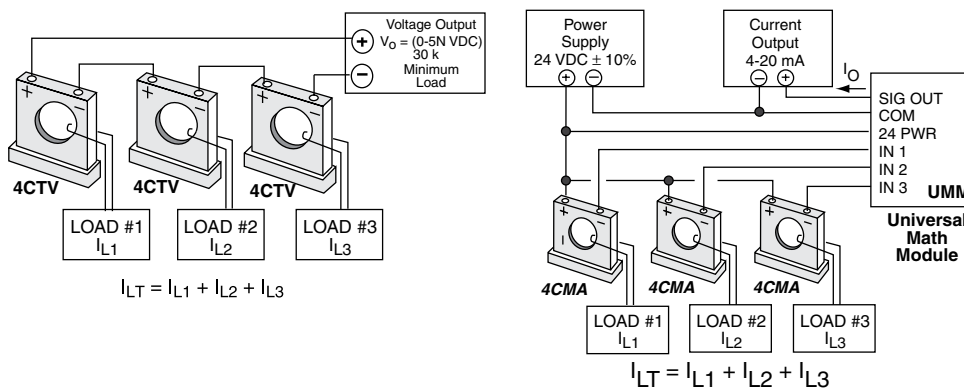
V_o = VDC from 4CTV

4CMA Formula:

$$I_L \text{ (load amps)} = \frac{\text{CT primary rating}}{\text{rating}} \times \left(\frac{I_o - 4}{16} \right)$$

I_o = mA DC from 4CMA

APPLICATION #3. Monitoring and Summing Multiple Loads



Note: If the loads are from secondaries of current transformers, the CT ratios and the turns on the 4CTVs and 4CMA must all be the same. If CTs are used, the CT primary amps would be the total for all CTs used.

4CTV Formula: For loads under 20 amps

$$I_{LT} \text{ (load amps)} = \frac{20 \times N}{\text{turns}} \times \left(\frac{V_o}{5 \times N} \right)$$

4CTV Formula: For loads over 20 amps

$$I_{LT} \text{ (load amps)} = \frac{\text{CT primary rating total}}{\text{rating total}} \times \left(\frac{V_o}{5 \times N} \right)$$

V_o = VDC from 4CTVs
 turns = number of times conductor passes through 4CTV
 N = number of loads monitored

4CMA Formula: For loads under 20 amps

$$I_{LT} \text{ (load amps)} = \frac{20 \times N}{\text{turns}} \times \left(\frac{I_o - 4}{16} \right)$$

4CMA Formula: For loads over 20 amps

$$I_{LT} \text{ (load amps)} = \frac{\text{CT Primary rating total}}{\text{rating total}} \times \left(\frac{I_o - 4}{16} \right)$$

N = number of loads monitored

turns = number of times conductor passes through 4CMA

I_o = mA from UMM

ORDERING INFORMATION

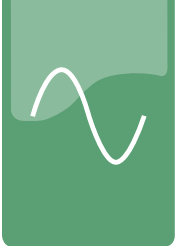
MODEL
 4CTV
 4CMA

DESCRIPTION
 Current transducer, 0-5 VDC voltage output
 Current transducer, 4-20 mA current output

RELATED PRODUCTS

500T/501T Split-core current transformers
600T/601T Split-core current transformers
AL/RL Solid-core current transformers

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POWER MONITORING & PROTECTION

AC CURRENT TRANSDUCER WITH CURRENT OUTPUT

CX, SCX SERIES (CURRENT)

DESCRIPTION

The **Kele CX/SCX Series** AC Current Transducers can be used to directly monitor up to 200 amps and output a 4-20 mA signal. Available in a split-core design that allows for easy installation of the transducer on existing wiring or in a lower cost solid-core version.

FEATURES

- May eliminate the need for a current transformer
- Small size
- Loop powered
- Easily installed over existing cable with split-core design
- UL listed, CE certified



SCX42050



CX42050



SCX420200



CX420200

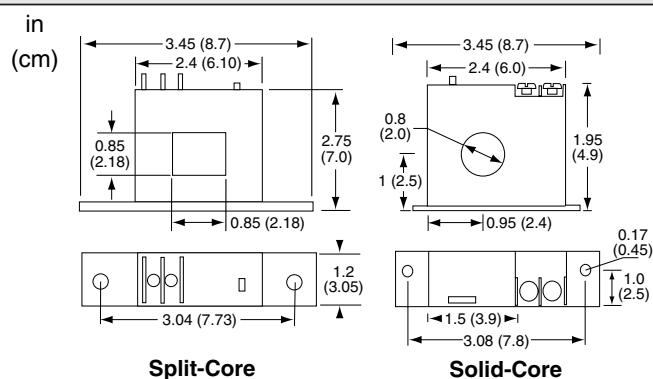


SPECIFICATIONS

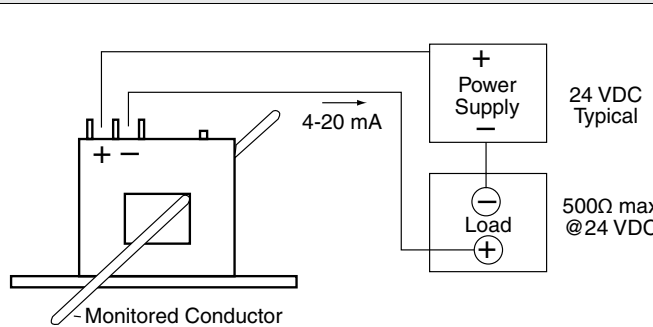
MODEL	RANGE (amps)	JUMPER	MAX CONT (amps)
CX42050	0-10	None	80
SCX42050	0-20 0-50	Mid High	120 200
CX420200	0-100	None	175
SCX420200	0-150 0-200	Mid High	300 400

Frequency	10-400 Hz
Output	4-20 mA
Output Impedance	500Ω maximum @ 24 VDC
Isolation Rating	1270 VAC
Accuracy	±1% FS
Response Time	250 ms, 0-90°
Internal Protection	Reverse voltage protection
Overrange Limit	Sensor self-limits output to 40 mA
Operating Temperature	-22° to 158°F (-30° to 70°C)
Materials Of Construction	Thermoplastic (meets UL flammability rating 94V-0)
Weight	0.25 lb (0.11 kg)
Approvals	UL and ULC listed, File #E320368, CE
RoHS Statement	Yes
Warranty	5 years

DIMENSIONS



WIRING



ORDERING INFORMATION

MODEL	DESCRIPTION
CX42050	Solid-core current transducer, 0-50A, 4-20 mA output
CX420200	Solid-core current transducer, 0-200A, 4-20 mA output
SCX42050	Split-core current transducer, 0-50A, 4-20 mA output
SCX420200	Split-core current transducer, 0-200A, 4-20 mA output

POWER MONITORING & PROTECTION

AC CURRENT TRANSDUCERS WITH VOLTAGE OUTPUT CX, SCX SERIES (VOLTAGE)



DESCRIPTION

The **Kele CX/SCX Series AC Current Transducers** with Voltage Output can be used to directly monitor up to 200A and output a 0-5 or 0-10 VDC signal. Available in a split-core design that allows for easy installation of the transducer on existing wiring or in a lower-cost solid-core version.

FEATURES

- May eliminate the need for a current transformer
- Small size
- No power supply needed
- Split-core model easily installed over existing cable
- UL listed, CE certified



SCX05V50



CX05V50



SCX10V200

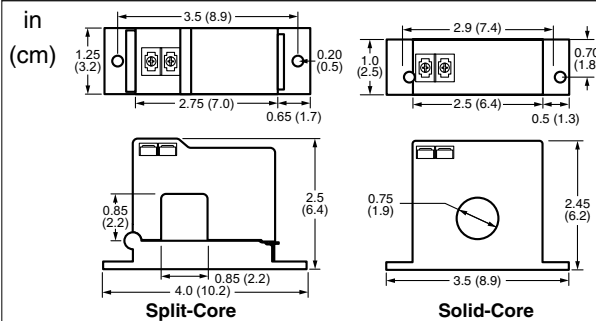


CX10V200

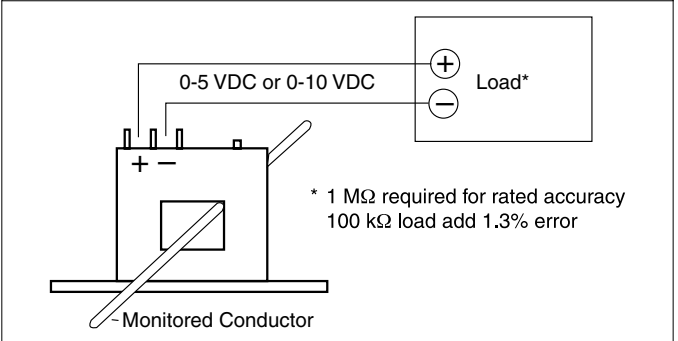


SPECIFICATIONS				
MODEL	RANGE (amps)	OUTPUT	JUMPER	MAX CONT (amps)
CX05V50 SCX05V50	0-10 0-20 0-50	0-5 VDC	None Mid High	80 120 200
CX05V200 SCX05V200	0-100 0-150 0-200	0-5 VDC	None Mid High	175 300 400
CX10V50 SCX10V50	0-10 0-20 0-50	0-10 VDC	None Mid High	80 120 200
CX10V200 SCX10V200	0-100 0-150 0-200	0-10 VDC	None Mid High	125 300 400
Frequency		50-60 Hz		
Output		0-5 VDC or 0-10 VDC		
Output Impedance		1 MΩ required for rated accuracy 100 kΩ load add 1.3% error		
Isolation Rating		1270 VAC		
Accuracy		±1% FS over 5% to 100% of range		
Response Time		250 ms, 0-90%		
Operating Temperature		-22° to 158°F (-30° to 70°C)		
Materials Of Construction		Thermoplastic (meets UL flammability rating 94V-0) 0.25 lb (0.11 kg) UL and ULC listed, File #E320368, CE		
Window Size				
Approvals				
Warranty		5 years		

DIMENSIONS



WIRING



ORDERING INFORMATION

MODEL	DESCRIPTION
CX05V50	Solid-core current transducer, 0-50A, 0-5 VDC output
CX05V200	Solid-core current transducer, 0-200A, 0-5 VDC output
CX10V50	Solid-core current transducer, 0-50A, 0-10 VDC output
CX10V200	Solid-core current transducer, 0-200A, 0-10 VDC output
SCX05V50	Split-core current transducer, 0-50A, 0-5 VDC output
SCX05V200	Split-core current transducer, 0-200A, 0-5 VDC output
SCX10V50	Split-core current transducer, 0-50A, 0-10 VDC output
SCX10V200	Split-core current transducer, 0-200A, 0-10 VDC output

POWER MONITORING & PROTECTION

CURRENT TRANSDUCERS

A/CT, A/SCT SERIES

DESCRIPTION

Current sensors monitor the current flowing to electrical equipment. The magnitude of the analog output signal is proportional to the current flow through the wire. The **A/CT** series offers solid-core sensors with 4-20mA, 0-5VDC, or 0-10VDC outputs. The **A/SCT** series offers split-core sensors for retrofit applications with the same available outputs. Sensors are available with various input current ranges from 5 to 250 amps. True RMS models make monitoring of VFD applications a snap.

FEATURES

- Available in solid-core or split-core
- 5 VDC, 10 VDC or 4-20mA outputs
- Voltage output models are self-powered
- Integral DIN rail mount
- True RMS versions for VFD applications



A/CT



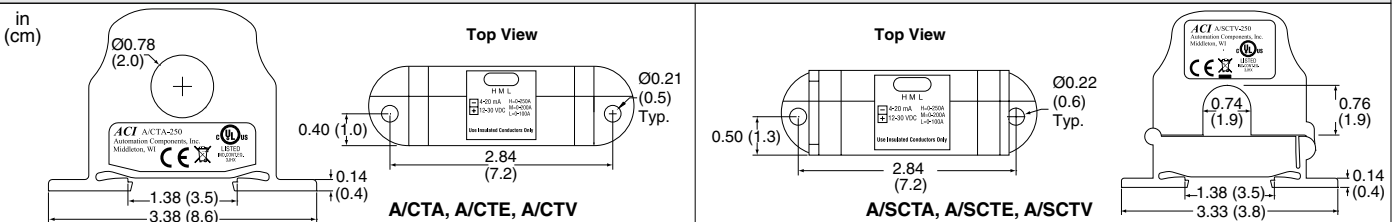
A/SCT



SPECIFICATIONS

Supply Voltage A/CTA, A/SCTA	12 to 30 VDC	Maximum Sensing Current Voltage	600 VAC
A/CTE, A/CTV, A/SCTE, A/SCTV	Induced from monitored conductor	Isolation Rating	2200 VAC
Supply Current A/CTA, A/SCTA	36 mA maximum	Accuracy A/CTA, A/SCTA	±0.5%
Frequency A/CTA, A/SCTA	30 to 60 Hz	A/CTE, A/CTV, A/SCTE, A/SCTV	±1%
A/CTE, A/CTV, A/SCTE, A/SCTV	50 to 600 Hz	Operating Temperature	5° to 104°F (-15° to 40°C)
Output A/CTA, A/SCTA	4-20 mA, 2-wire, loop-powered	VFD models	32° to 104°F (0° to 40°C)
A/CTE, A/SCTE	0-5 VDC	Operating Humidity	0 to 95% (non-condensing)
A/CTV, A/SCTV	0-10 VDC	Mounting	DIN rail size 35 mm
Output Impedance A/SCTA	700 @ 24 VDC	Window Size	0.75", accepts up to 350 MCM cables
A/SCTA-VFD	700 @ 24 VDC	Weight	0.24 lbs (0.109 kg)
		Approvals	UL listed, File #E309723, CE
		Warranty	5 years, limited
		RoHS Statement	Yes
		Enclosure Rating	UL94-5VB

DIMENSIONS



ORDERING INFORMATION

MODEL	DESCRIPTION
A/CTA-5	Solid-core, loop-powered current sensor, 0-5A input, 4-20 mA output
A/CTA-50	Solid-core, loop-powered current sensor, 0-10/20/50A input, 4-20 mA output
A/CTA-250	Solid-core, loop-powered current sensor, 0-100/200/250A input, 4-20 mA output
A/CTA-50-VFD	Solid-core, loop-powered true RMS current sensor, 0-10/20/50A input, 4-20 mA output
A/CTA-250-VFD	Solid-core, loop-powered true RMS current sensor, 0-100/200/250A input, 4-20 mA output
A/SCTA-5	Split-core, loop-powered current sensor, 0-5A input, 4-20 mA output
A/SCTA-50	Split-core, loop-powered current sensor, 0-10/20/50A input, 4-20 mA output
A/SCTA-200	Split-core, loop-powered current sensor, 0-100/150/200A input, 4-20 mA output
A/SCTA-50-VFD	Split-core, loop-powered true RMS current sensor, 0-10/20/50A input, 4-20 mA output
A/SCTA-200-VFD	Split-core, loop-powered true RMS current sensor, 0-100/150/200A input, 4-20 mA output
A/CTE-50	Solid-core, self-powered current sensor, 0-10/20/50A input, 0-5 VDC output
A/CTE-250	Solid-core, self-powered current sensor, 0-100/200/250A input, 0-5 VDC output
A/CTV-50	Solid-core, self-powered current sensor, 0-10/20/50A input, 0-10 VDC output
A/CTV-250	Solid-core, self-powered current sensor, 0-100/200/250A input, 0-10 VDC output
A/SCTE-50	Split-core, self-powered current sensor, 0-10/20/50A input, 0-5 VDC output
A/SCTE-250	Split-core, self-powered current sensor, 0-100/200/250A input, 0-5 VDC output
A/SCTV-50	Split-core, self-powered current sensor, 0-10/20/50A input, 0-10 VDC output
A/SCTV-250	Split-core, self-powered current sensor, 0-100/200/250A input, 0-10 VDC output



DESCRIPTION

The Relay In a Box **RIBX-V Series** provides a unique and cost-effective solution to on/off motor control and analog current sensing. Combined in a single, convenient junction box with high- and low-voltage separation are a control relay and a current sensing transducer that outputs 0-5 VDC or 0-10 VDC. A three-position closed/open/auto switch is available to override the output of the relay. This versatile product allows both control and analog current sensing of electrical loads by a building automation system, all in a self-contained, easy-to-install housing.

FEATURES

- *Cost-effective analog current sensing with a control relay*
- *Self-contained housing with high- and low-voltage separation*
- *LED indication of relay*
- *Optional relay contact override switch*
- *Plenum-rated housing*
- *UL and ULC listed for UL 916 Energy Management and UL 864 Fire*

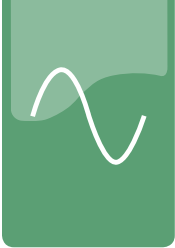


RIBX-V

Functional
Devices, Inc.



SPECIFICATIONS			
Frequency	50/60 Hz	Lead Wires	16" (40.6 cm)
Output	0-5 VDC or 0-10 VDC, proportional to current sensing range	Operating Temperature	-30° to 140°F (-34° to 60°C)
Output Impedance	30 kΩ minimum	Operating Humidity	5% to 95% (non-condensing)
LED Indication	LED on = relay activated	Dimensions	4"H x 4"W x 1.8"D (10.2 x 10.2 x 4.6 cm), NEMA 1 th 1/2" NPT
Relay		Weight	Approximately 1 lb (0.45 kg)
Life Rating	10 million cycles minimum mechanical	Approvals	UL and cUL listed, file #E68805 (UL 916) and #S7312 (UL 864)
Pull In Voltage		RoHS Statement	Yes
10-30 VAC/VDC models	9 VAC, 10 VDC	Warranty	1 year
24 VAC/VDC models	18 VAC, 22 VDC		
Drop Out Voltage			
10-30 VAC/VDC models	2.1 VAC, 2.8 VDC		
24 VAC/VDC models	3 VAC, 3.8 VDC		
Accuracy	±1% FS		



POWER MONITORING & PROTECTION

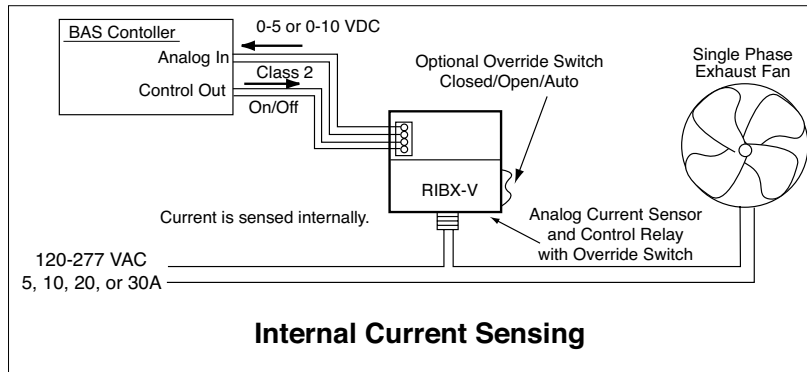
CURRENT TRANSDUCER AND RELAY

RIBX-V SERIES

APPLICATION

Internal Current Sensing

The **RIBX-V Series** with internal current sensing is great for direct control and analog current sensing of exhaust fans, pumps, and other single-phase electrical loads up to 20A. The control relay contacts of these models wire directly in series with single-phase motors using the wires that exit the housing through the 1/2" conduit hub. The current of the load is sensed within the housing. Low-voltage wiring from the controller for the control relay coil and analog current signal enter the separate Class 2 wiring compartment in the housing through star bushings or conduit and are connected to screw terminals.



Internal Current Sensing

ORDERING INFORMATION

MODEL	CURRENT SENSING	CURRENT SENSING RANGE (amps)	OVER SW	RELAY CONTACT RATINGS	RELAY CONTACT WIRING	RELAY COIL AND ANALOG OUTPUT
RIBXLCEV	Internal	0-5	—	* 5A resistive 277 VAC 345 VA pilot duty 120/240 VAC N.O. 211 VA pilot duty 120/240 VAC N.C. 268 VA pilot duty 277 VAC N.O. 175 VA pilot duty 277 VAC N.C. 1/3 hp for N.O. 120/240 VAC 1/6 hp for N.C. 120/240 VAC 1/4 hp for N.O. 277 VAC 1/8 hp for N.C. 277 VAC	RIBXLCEV, RIBXLCV 1-SPDT Relay (blue) — N.C. (yellow) — COM (orange) — N.O.	Relay input current 30 mA @ 10 VAC 12 mA @ 10 VDC 32 mA @ 12 VAC 14 mA @ 12 VDC 42 mA @ 24 VAC 16 mA @ 24 VDC 50 mA @ 30 VAC 18 mA @ 30 VDC Relay coil wiring 10-30 VAC/VDC } Common } Analog out wiring 0-10 VDC } 0-5 VDC } Common }
RIBXLSEV			Yes			
RIBXLCV	Internal	0-10	—	* 10A resistive 120/240/277 VAC - 28 VDC 480 VA pilot duty 240/277 VAC 480 VA ballast 277 VAC 600W tungsten 120 VAC N.O. 240W tungsten 120 VAC N.C. 1/3 hp for N.O. 120/240 VAC 1/6 hp for N.C. 120/240 VAC 1/4 hp for N.O. 277 VAC 1/8 hp for N.C. 277 VAC	RIBXLSEV, RIBXLSV 1-SPST Relay (orange)* — Closed (orange)* — Open (orange)* — Auto 1	
RIBXLSV			Yes			
RIBX24BV	Internal	0-20	—	* 20A resistive 277 VAC 1110 VA pilot duty 277 VAC 240W tungsten N.C. 120 VAC 770 VA pilot duty 120 VAC 1 hp 120 VAC 2 hp 277 VAC 20A ballast N.O. 277 VAC 10A ballast N.C. 277 VAC 10A tungsten N.O. 120 VAC Not rated for electrical.	1-SPDT Relay (blue) — N.C. (yellow) — COM (orange) — N.O. 1-SPST Relay (orange) — Closed (orange) — Open (orange) — Auto 1	Relay input current 75 mA @ 24 VAC, 32 mA @ 24 VDC Relay coil wiring 24 VAC/VDC } Common } Analog out wiring 0-10 VDC } 0-5 VDC } Common }
RIBX24SBV			Yes			
RIBX243PV	Internal	0-20	—	* 20A resistive 300 VAC 20A resistive 28 VDC 15A resistive 600 VAC 1 hp 120 VAC, 1 Ph 2 hp 240-277 VAC, 1 Ph 3 hp 480-600 VAC, 1 Ph 5 hp 240 VAC, 3 Ph 7.5 hp 480 VAC, 3 Ph 20A ballast 277-480 VAC	(blue) — N.O. (blue) — (yellow) — N.O. (yellow) — (orange) — N.O. (orange) — 2	Relay input current 190 mA @ 24 VAC Relay coil wiring 24 VAC/VDC } Common } Analog out wiring 0-10 VDC } 0-5 VDC } Common }
RIBXV	Internal	0-30	—	Current transducer only, 0-30A	Current Sensor Wiring (purple) — (purple) —	Analog out wiring 0-10 VDC } 0-5 VDC } Common }

Note: 1 Internal yellow jumper determines if SPST contacts are N.O. or N.C. 2 Order N.C. by adding -NC after model number.
* Not rated for electrical ballast.

POWER MONITORING & PROTECTION

HIGH AC CURRENT TRANSDUCERS WITH CURRENT OUTPUT SENTRY 200-A SERIES



DESCRIPTION

The **Sentry 200-A Series** High AC Current Transducers with Current Output can be used to directly monitor up to 2000A without requiring an additional current transformer. The output from these transducers is a 4-20 mA signal.

FEATURES

- *Eliminates the need for a current transformer*
- *Large aperture to accommodate large conductors or wire bundles*
- *Loop powered 4-20 mA output*
- *Multi-range input eliminates zero and span adjustments*
- *Easy installation with integral mounting brackets*



200-3-A



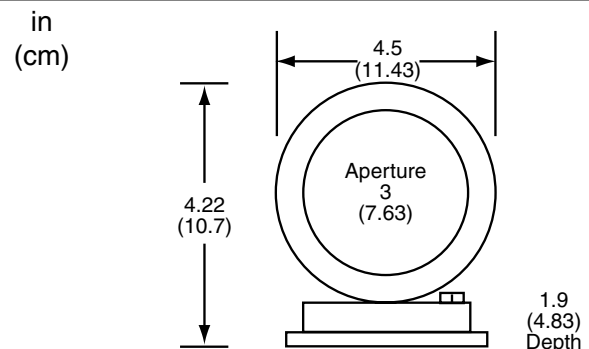
SPECIFICATIONS

MODEL	RANGE	SWITCH POSITION	MAX CONT	MAX FOR 6 SEC	MAX FOR 1 SEC
			(amps)		
200-3-A	0-375	375	750	1500	3750
	0-500	500			
	0-750	750			
200-4-A	0-1000	1000	2000	4000	10,000
	0-1333	1333			
	0-2000	2000			

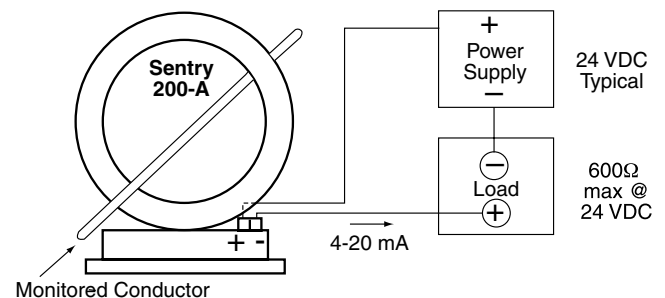
Supply Voltage	24 - 40 VDC
Frequency	50 - 60 Hz
V Models	10 - 400 Hz
Output	4 - 20 mA, loop-powered
Output Impedance	600Ω max @ 24 VDC
Insulation Voltage	600 VAC
Accuracy	1.0% FS
Response Time	500 ms to 90% of step change
Overrange Limit	Sensor self-limits to 25 mA output
Terminations	Screw terminals
Materials Of Construction	UL 94 flammability rated thermoplastic
Weight	1.3 lb (0.6 kg)
Approvals	UL and ULC listed, File #E129625, CE pending
Warranty	5 years

Note: The standard models are average responding. Also available are variable frequency integration models for monitoring the load side of a VFD.

DIMENSIONS



WIRING



ORDERING INFORMATION

MODEL	DESCRIPTION
200-3-A	Solid-core high current transducer, 0-750A, 4-20 mA output
200-3-A-V	Solid-core high current transducer, 0-750A, 4-20 mA output (10 - 400 Hz)
200-4-A	Solid-core high current transducer, 0-2000A, 4-20 mA output
200-4-A-V	Solid-core high current transducer, 0-2000A, 4-20 mA output (10 - 400 Hz)



POWER MONITORING & PROTECTION

THREE-PHASE VOLTAGE MONITORS

258, 269

DESCRIPTION

Models 258 and 269 continuously monitor three-phase power lines for phase loss, phase reversal, and low voltage. **Model 269** also monitors for high voltage. **Models 258 and 269** do not require a neutral connection and can be used with any Wye or Delta systems. When correct voltage and phase rotation are applied, the internal relay will energize. A fault condition will de-energize the relay. When the fault is corrected, the monitor will automatically reset.



258



269



SPECIFICATIONS

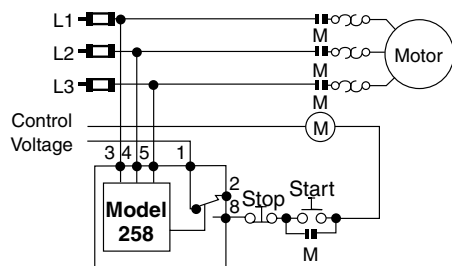
	B258B	258B	A258B	A269	B269	C269
Nominal AC Voltage (VAC phase to phase)	120	208/240	480	120	208/240	480
Adjustment Range (VAC)	85-120	160-240	380-480	110-145 80-115	210-280 170-240	400-540 380-460
Frequency (Hz)	60	60	60	60	60	60
Power Consumption (W)	0.75	1.5	4.5	1.5	3.0	6.0
Response Time	50ms	50ms	50ms	Adj. 1-10 sec	Adj. 1-10 sec	Adj. 1-10 sec
Reset Time	50ms	50ms	50ms	0.25 sec	0.25 sec	0.25 sec
Mounting	RB08-PC	RB08-PC	RB08-PC	Surface	Surface	Surface
Weight oz (g)	5 (141.7)	5 (141.7)	5 (141.7)	9 (255.1)	9 (255.1)	9 (255.1)
Agency Approvals (UL file #E60400)	UR, CSA	UR, CSA	UR*, CSA	UL, CSA	UL, CSA	UL, CSA

Repeat Accuracy	±0.1% of setpoint (fixed conditions)
Reset Type	Automatic
Deadband	Approx 2%
Output Contacts	SPDT
Contact Rating	10A @ 240 VAC, resistive

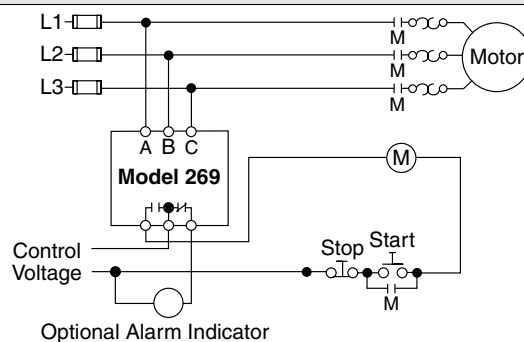
* Condition of acceptability: **A258B** must be used with the **RB08-PC** socket.

Operating temp	-20° to 131°F (-30° to 55°C)
Humidity	0-97% noncondensing
Dimensions	
258	1.95"H x 1.95"W x 3.25"D (4.96 x 4.96 x 8.25 cm)
RB08-PC	2.25"H x 2.0"W x 0.625"D (5.7 x 5.1 x 1.6 cm)
269	6.06"H x 3.88"W x 2.82"D (15.4 x 9.9 x 7.1 cm)
Warranty	5 years

WIRING



Shown de-energized
258



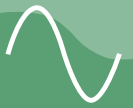
Shown de-energized
269

ORDERING INFORMATION

MODEL	DESCRIPTION
A258B	Three-phase voltage monitor, 480 VAC
258B	Three-phase voltage monitor, 208/240 VAC
B258B	Three-phase voltage monitor, 120 VAC (use with Model 3PT3 potential transformer)
RB08-PC	600V/10A socket (required with each 258 voltage monitor)
A269	Three-phase voltage monitor, 120 VAC (use with Model 3PT3 potential transformer)
B269	Three-phase voltage monitor, 208/240 VAC
C269	Three-phase voltage monitor, 480 VAC

POWER MONITORING & PROTECTION

MOTORSaver™ THREE-PHASE VOLTAGE MONITOR 201A



DESCRIPTION

The **MotorSaver™ 201A** Three-Phase Voltage Monitor is an autoranging plug-in voltage monitor designed to protect three-phase motors regardless of size. It is used on 190-480 VAC 50/60 Hz motors to prevent damage caused by single phasing, low voltage, phase reversal, or voltage unbalance. To detect harmful power line conditions, the unique microprocessor-based voltage and phase sensing circuit constantly monitors the three-phase voltages. When a harmful condition is detected, the **Model 201A** MotorSaver's output relay is deactivated after a fixed trip-delay time period. The output relay reactivates after power line conditions return to an acceptable level for a fixed restart delay time. The trip delay prevents nuisance tripping due to rapidly fluctuating power line conditions.

FEATURES

- **Protection of three-phase motors against single phasing, low voltage, phase reversal, and voltage unbalance**
- **DIN rail- or surface-mounted socket**
- **UL and ULC listed, CE certified**
- **Bicolor LED indication of normal and fault conditions**
- **Single-phase condition detection regardless of regenerated voltages**

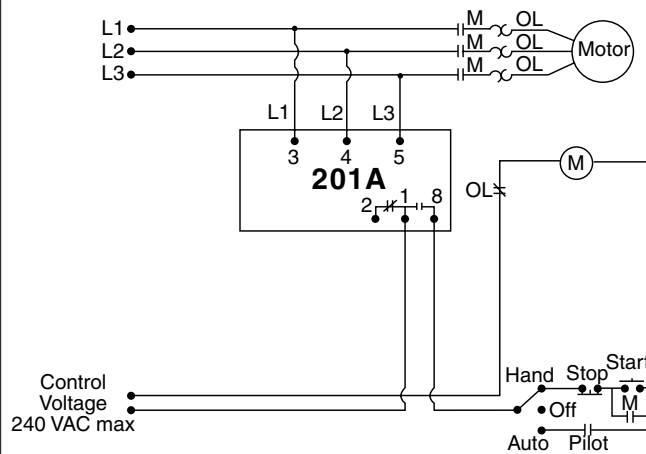


201A



OT08PC

WIRING



Shown de-energized
Model 201A

SPECIFICATIONS

Supply Watts	5W
Frequency	50* or 60 Hz
Transient Protection	2500V for 10 ms
Line Voltage Monitored	Three-phase, 190-480 VAC, adjustable
Low Voltage Trip	90% of setpoint
Low Voltage Reset	93% of setpoint
Reset Delay Time after Fault	2 seconds
Reset Delay Time after Power Loss	2 seconds
Trip Delay Time Low Voltage	4 seconds
Trip Delay Time Phase Fault	2 seconds
Trip Delay Time Unbalance	2 seconds
Voltage Unbalance Reset	4.5%
Voltage Unbalance Trip	6%
Dimensions	2.37"W x 1.75"H x 4.25"L (6.0 x 4.4 x 10.8cm)
Weight	0.56 lb (0.25 kg)
Approvals	UL Listed, File #E68520, CE certified
Warranty	5 years

* 50 Hz will increase all delay times by 20%.

ORDERING INFORMATION

MODEL	DESCRIPTION
201A	MotorSaver three-phase voltage monitor
OT08PC	Socket, 600 VAC, DIN rail or surface mount



POWER MONITORING & PROTECTION

MOTRSAVER™ THREE-PHASE VOLTAGE MONITOR 250A

DESCRIPTION

The **MotorSaver™ 250A** Three-Phase Voltage Monitor is an autoranging voltage monitor designed to protect three-phase motors regardless of size. It is used on 190-480 VAC, 50/60 Hz motors to prevent damage caused by single phasing, low voltage, phase reversal, voltage unbalance, and high voltage. Added features include DPDT contacts and an adjustable restart time-delay setting. The unique microprocessor-based voltage and phase-sensing circuit constantly monitors the three-phase voltages to detect harmful power line conditions. When a harmful condition is detected, the **Model 250A's** output relays are deactivated after a fixed trip-delay time period. The output relay reactivates after power line conditions return to an acceptable level for an adjustable restart delay time. The trip and reset delays prevent nuisance tripping due to rapidly fluctuating power line conditions.



250A



FEATURES

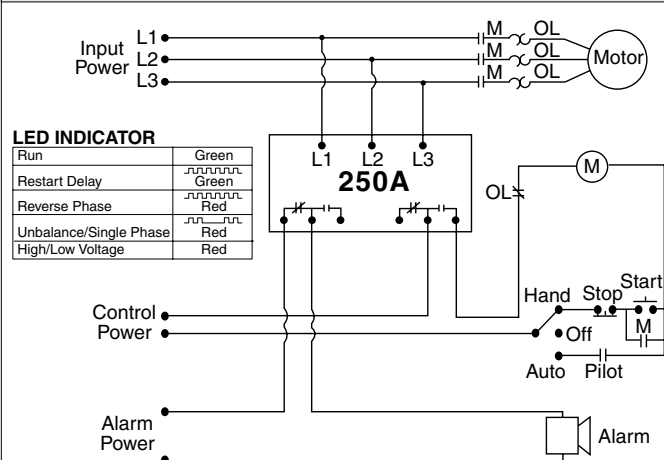
- *Protection of three-phase motors from single phasing, low-voltage, phase reversal, voltage unbalance, and high voltage*
- *Adjustable restart delay*
- *DPDT contacts*
- *UL and cUL listed*
- *Bicolor LED indication of normal and fault conditions*
- *Detection of single-phase conditions regardless of regenerated voltages*

SPECIFICATIONS

Supply Watts	5W
Frequency	50* or 60 Hz
Contact Rating	DPDT, pilot duty 480 VA @ 240 VAC General-purpose 10A @ 240 VAC
Transient Protection	IEC 1000-4-5
Line Voltage Monitored	190-480 VAC, adjustable
Low Voltage Trip	90% of setpoint
Low Voltage Reset	93% of setpoint
Reset Delay Time after Fault	Manual or 2-300 seconds
Reset Delay Time after Power Loss	Manual or 2-300 seconds
Trip Delay Time High Voltage	4 seconds
Trip Delay Time Low Voltage	4 seconds
Trip Delay Time Phase Fault	2 seconds
Trip Delay Time Unbalance	2 seconds
Voltage Unbalance Reset	4.5%
Voltage Unbalance Trip	6%
Operating Temperature	-40° to 158°F (-40° to 70°C)
Dimensions	5.25"W x 2.9"H x 2.92"D (13.3 x 7.4 x 7.4 cm)
Weight	0.875 lb (0.396 kg)
Approvals	UL and cUL listed, File #E68520
Warranty	5 years

* 50 Hz will increase all delay times by 20%.

WIRING



shown de-energized
Motor Protection with Local Alarm

ORDERING INFORMATION

MODEL	DESCRIPTION
250A	MotorSaver three-phase voltage monitor

POWER MONITORING & PROTECTION

MOTORSAVER™ THREE-PHASE VOLTAGE MONITOR 355 SERIES



DESCRIPTION

The **MotorSaver™ 355 Series** Three-Phase Voltage Monitors are designed to protect three-phase motors regardless of size. The **355-200** model monitors 190-240 VAC input voltages, the **355-400** model monitors 380-480 VAC input voltages, and the **355-600** model monitors 575-600 VAC input voltages. The unique microprocessor-based voltage and phase-sensing circuit constantly monitors the three-phase voltages to detect harmful power line conditions, including single phasing, low-voltage, phase reversal, voltage unbalance, and high voltage. When a harmful condition is detected, the **355 Series** output relays are deactivated after an adjustable trip-delay time period. The output relay reactivates after power line conditions return to an acceptable level for an adjustable restart delay time. The trip and reset delays prevent nuisance tripping due to rapidly fluctuating power line conditions.

FEATURES

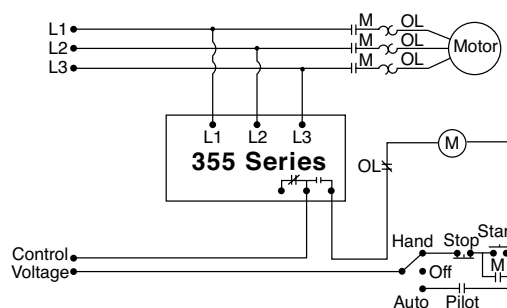
- **Protection of three-phase motors from loss of any phase, low-voltage, phase reversal, voltage unbalance, and high voltage**
- **Adjustable restart delay**
- **Adjustable trip delay**
- **Adjustable voltage-unbalance trip point**
- **Four diagnostic LEDs show overvoltage, undervoltage, voltage unbalance, reverse-phase and normal conditions**
- **UL and ULC listed**
- **Single-phase condition detection regardless of regenerated voltages**



355-400



WIRING



Shown de-energized

SPECIFICATIONS

Supply Watts	6W maximum	Trip Delay Time Low Voltage	2-30 seconds, adjustable
Frequency	50*/60 Hz	Trip Delay Time Phase Fault	0.5 seconds
Contact Rating	SPDT, pilot duty 470 VA @ 600 VAC (400 or 600V range) General-purpose 10A @ 240 VAC (200V range) 1hp @ 240 VAC (200V range)	Trip Delay Time Unbalance	2-30 seconds, adjustable
Transient Protection	2500V for 10 ms	Voltage Unbalance Reset	Trip setting minus 1%
Line Voltage Monitored	190-240, 380-480, or 575-600 VAC	Voltage Unbalance Trip	2% to 8%, adjustable
Low Voltage Trip	90% of setpoint ($\pm 1\%$)	Dimensions	2.9"H x 5.25"W x 2.9"D
Low Voltage Reset	93% of setpoint ($\pm 1\%$)	(7.4 x 13.3 x 7.4 cm)	
Reset Delay Time after Fault	Manual or 2-300 seconds	Weight	1.0 lb (0.45 kg)
Reset Delay Time after Power Loss	Manual or 2-300 seconds	Approvals	UL and cUL listed, File #E68520
Trip Delay Time High Voltage	2-30 seconds, adjustable	Warranty	5 years

* 50 Hz will increase all delay times by 20%.

ORDERING INFORMATION

MODEL	DESCRIPTION
355-200	Three-phase voltage monitor, 190-240 VAC
355-400	Three-phase voltage monitor, 380-480 VAC
355-600	Three-phase voltage monitor, 575-600 VAC



POWER MONITORING & PROTECTION

MOTORSaver™ THREE-PHASE VOLTAGE MONITOR 455 SERIES

DESCRIPTION

The **Model 455** three-phase voltage monitor combines load and line-side monitoring to alert the user of contact failure or impending contact failure. The line-side monitoring will protect the motor from damaging line-side conditions prior to the motor starting. With the **Model 455**, your motor is fully protected at all times. The motor will not start if a power problem is present.

The monitor is equipped with an infrared LED to communicate with the handheld diagnostic tool, the Informer-MS, to display MotorSaver® data to assist in monitoring and troubleshooting the system. Motor run hours, displayed by the Informer-MS can now be reset on the **Model 455**.

FEATURES

- The 455's universal range from 190-480VAC 50/60 Hz provides the versatility needed to handle global applications.
- Four adjustment pots provide versatility for a variety of applications.
- Load and line-side monitoring provides contactor protection.
- Diagnostic LEDs indicate trip status and provide simple troubleshooting.
- Microcontroller-based circuitry for better accuracy and higher reliability.

SPECIFICATIONS

Supply Watts	6W maximum
Frequency	50*/60 Hz
Contact Rating	SPDT 480 VA @ 240 VAC pilot duty 10A general purpose SPDT high voltage relay (-480R) 470 VA @ 600 VAC pilot duty
Transient Protection	IEC 1000-4-5; 1995 ± 6K1
Line Voltage Monitored	
455	190 - 480 VAC
455 - 480R	380 - 480 VAC
455 - 575	475 - 600 VAC
Low Voltage Trip	90% of setpoint (±1%)
Low Voltage Reset	93% of setpoint (±1%)
Reset Delay Time after Fault	Manual or 2-300 seconds
Reset Delay Time after Power Loss	Manual or 2-300 seconds
Trip Delay Time High Voltage	2-30 seconds, adjustable
Trip Delay Time Low Voltage	2-30 seconds, adjustable
Trip Delay Time Phase Fault	0.5 seconds
Trip Delay Time Time Unbalance	2-30 seconds, adjustable
Voltage Unbalance Reset	Trip setting minus 1%
Voltage Unbalance Trip	2% to 8%, adjustable
Dimensions	2.9"H x 5.25"W x 2.9"D (7.4 x 13.3 x 7.4 cm)
Weight	0.88 lb (0.396 kg)
Approvals	UL and cUL listed, #E68520, CS1, C1
Warranty	5 years

* 50 Hz will increase all delay times by 20%.

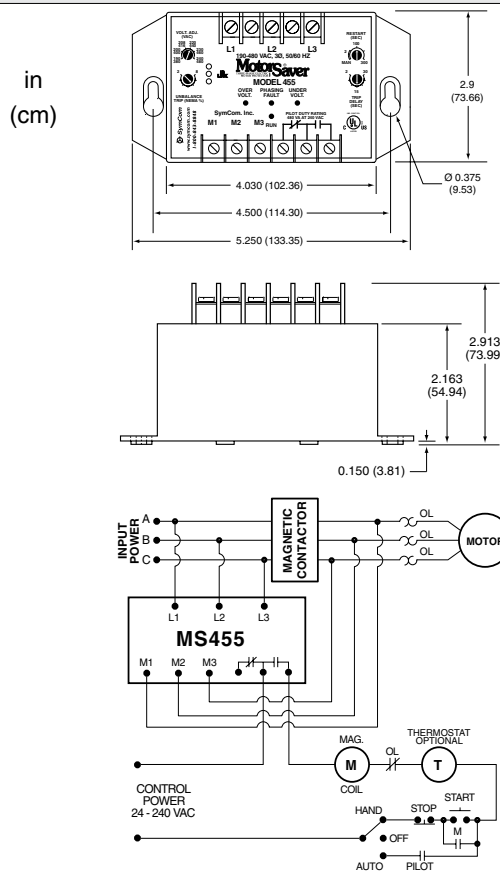


Model 455



- Single-phase conditions are detected regardless of regenerated voltages.
- Transient protection meets IEEE and IEC standards and permits operation under tough conditions.

WIRING



ORDERING INFORMATION

MODEL
455
455-480R
455-575
INFORMER-MS

DESCRIPTION
Three-phase voltage monitor, 190-480 VAC
Three-phase voltage monitor, 380-480 VAC
Three-phase voltage monitor, 575-600 VAC
Hand held diagnostic/trouble shooting tool



DESCRIPTION

The **MotorSaver™ Model 460** microcontroller-based voltage and phase sensing circuit constantly monitors the three phase voltage to detect harmful power line conditions. When a harmful condition is detected, the **Model 460** output relay is deactivated after an adjustable trip delay time. The output relay reactivates after power line conditions return to an acceptable level for an adjustable restart delay time. If equipped with the manual reset option, an external normally open momentary reset switch must be closed to reactivate the output relay. The trip and restart delays prevent nuisance tripping due to rapidly fluctuating power line conditions. The **Model 460** automatically senses whether it is connected to a 190-240V 60 Hz system, a 440-480V 60 Hz system, or a 380-416V 50 Hz system. An adjustment is provided to set the nominal line voltage from 190-240 or 380-480 VAC. Other adjustments include a 1-30 second trip delay, a 1-500 second restart delay, and a 2% to 8% voltage-unbalance trip point adjustment.

FEATURES

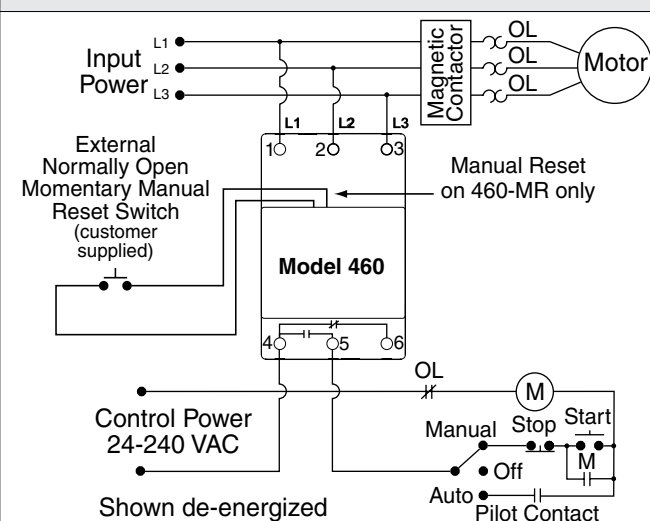
- **Protection of three-phase motors from loss of any phase, low-voltage, phase reversal, voltage unbalance, and high voltage**
- **Adjustable restart delay**
- **Adjustable trip delay**
- **Adjustable voltage unbalance trip point**
- **Optional manual reset**
- **Diagnostic LEDs for indication of trip status**
- **Single-phase condition detection regardless of regenerated voltages**
- **Surface or DIN rail mounting**



460



WIRING



SPECIFICATIONS

Supply Watts	6W maximum	Low Voltage Trip Delay Time	1-30 second adjustable
Frequency	50*/60 Hz	Phase Fault Trip Delay Time	1 second fixed
Humidity	10-95% RH, non-condensing	Unbalance Voltage Unbalance Reset	1-30 second adjustable
Contact Rating	SPDT, pilot duty 480 VA @ 240 VAC General-purpose 10A @ 240 VAC	Voltage Unbalance Trip	Trip setting minus 1% (5-8%) Trip setting minus 0.5% (2-4%)
Transient Protection	IEC 1000-4-5, ANSI/IEEE C62.41, UL508	Operating Temperature	-4° to 158°F (-20° to 70°C)
Line Voltage Monitored	190-480	Dimensions	3.5"H x 2.1"W x 2.4"D (8.9 x 5.3 x 6.1 cm)
Low Voltage Trip	90% of setpoint (±1%)	Weight	0.9 lb (0.4 kg)
Low Voltage Reset	93% of setpoint (±1%)	Approvals	UL and cUL listed, File #E68520, CE
Reset Delay Time after Fault	1-500 second adjustable	Warranty	5 years
Reset Delay Time after Power Loss	1-500 second adjustable		
Trip Delay Time High Voltage	1-30 second adjustable		
Trip Delay Time			

* 50 Hz will increase all delay times by 20%.

ORDERING INFORMATION

MODEL	DESCRIPTION
460	Three-phase voltage monitor, 190-480 VAC
460-MR	Three-phase voltage monitor, 190-480 VAC with manual reset
460-575	Three-phase voltage monitor, 190-480 VAC, 1-30 second trip delay, 1-500 second restart delay, 2-8% voltage unbalance trip point



POWER MONITORING & PROTECTION

SURGE PROTECTORS

DTK-120HW, DTK-MRJ11, DTK-2LVLP

DESCRIPTION

The **DTK Series** products are general-purpose MOV based power line, telephone line, and data line surge protectors. They are designed to protect electronic equipment from surges and spikes that may be present on power inputs, communications, or data lines.

FEATURES

- **Metal-Oxide Varistor (MOV) technology**
- **Self-restoring after each surge within ratings**
- **Nanosecond response time**
- **UL listed**



SPECIFICATIONS

DTK-MRJ11 Data/Phone Line Protection

Service Voltage	130 VRMS
Clamp Voltage	20V
Continuous Current	150 mA
Protection	RJ11/RJ14/RJ45 female to ground
Energy Dissipation	76 joules
Surge Current	2000 amps/pair (6V - 50V) 9000 amps/pair (75V - 130V)
Response Time	<5 ns
Connections	RJ11/RJ14/RJ45 female in/out + ground wire
Operating Temperature	-40° to 158°F (-40° to 70°C)
Operating Humidity	Maximum 95% (non-condensing)
Dimensions	1.7"H x 3.0"W x 1.2"D (6.9 x 7.8 x 2.9 cm)
Weight	0.25 lb (0.11 kg)
Approvals	UL 497A, File #E163310
Warranty	10 year limited

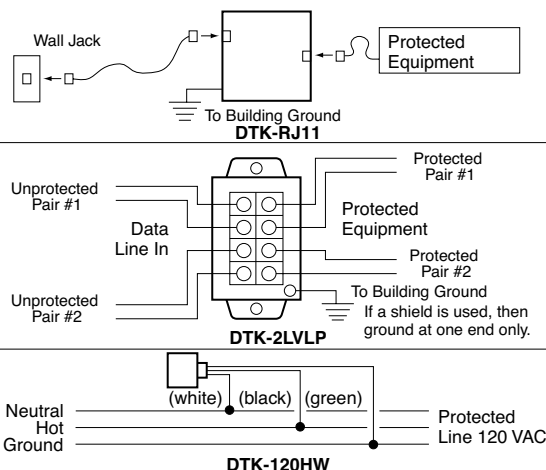
DTK-2LVLP Low-Voltage Data Line Protection Let Through Voltage

X:	15 VRMS
LV:	27 VRMS
Continuous Current	Unlimited
Accuracy	
X:	15 VRMS
LV:	27 VRMS
Protection	L-G (all lines protected)
Energy Dissipation	
X:	8 joules/pair
LV:	17 joules/pair
Surge Current	2000 amps/pair
Response Time	<5 ns
Connections	Screw terminals 22-16 AWG wire
Dimensions	1.6"H x 3.0"W x 1.6"D (4.1 x 7.6 x 4.1 cm)
Weight	0.15 lb (0.07 kg)
Approvals	UL 497B, File #E163310
Warranty	10 year limited

DTK-120HW Hard-Wired Surge Protection

Service Voltage	110/125 VAC
Frequency	0 Hz- 400 Hz
Filtering	RFI/EMI noise
Continuous Current	Unlimited
Protection	700 V L-N, L-G 600V N-G
Clamping Level	130 VRMS/185V peak
Surge Current	19,500A
Response Time	<1 ns
Connections	3/4" hub-mount 3-12 AWG leads
Dimensions	2.9"H x 2.8"W x 1.7"D (7.3 x 7.1 x 4.3 cm)
Weight	0.5 lb (0.22 kg)
Approvals	UL 1449 3rd Edition, cUL 1449, IEEE C62.41B, File #E136659
Warranty	10 years

WIRING



ORDERING INFORMATION

MODEL	DESCRIPTION	MODEL	DESCRIPTION
DTK-120HW	120V inline surge protector	DTK-2LVLPX	15V four-wire data line surge protector
DTK-120/240CM+	120/240 VAC surge protector	DTK-1LVLPX	1 pair 30V terminal strip surge protector
DTK-MRJ11	130V telephone line surge protector	DTK-1LVLPX	1 pair 14V terminal strip surge protector
DTK-2LVLP	27V four-wire data line surge protector	DTK-2LVLP-SCP-D	Low voltage surge protector

POWER/DATA SURGE PROTECTOR DTK-120SR, DTK-2MHLP



DESCRIPTION

The new **Model DTK-120SR** is an in-line, four-stage, power-line surge protector with EMI/RFI filtering. It is designed for mounting in an enclosure or control panel. Series installation eliminates the need to dedicate a circuit breaker for surge protection while allowing for installation flexibility. The 120SR meets stringent government and military specs for fire panel applications and is suitable for use on critical 20 Amp loads.

The **Model DTK-2MHLP** series of signal, data and loop circuit surge protectors provide robust protection in a compact package. Designed for ease of installation with convenient field-replaceable modules. The 2MHLP protects two circuit pairs per module. Applications include protection of 4-20mA current loops, alarm pane NAC, SLC and IDC loops, and burglar alarm panels.



DTK-120SR



DTK-2MHLP

FEATURES

DTK-120SR

- Series design for fast response and best protection
- Four-stage hybrid circuit design
- User replaceable fusing
- EMI/RFI filtering
- Compact design
- Screw terminals w/safety cover
- LED's for protection status, ground presence, ground fault indication and fuse status

DTK-2MHLPWB

- Multi-stage, SAD technology, hybrid design
- Hard-wire mounting base
- Field replaceable, hot swappable, modular edge card connection design
- Multiple voltage levels for variety of voice/data applications
- Two pairs protected per module, can be extended to ten pairs using a common ground using DTK-MB base



SPECIFICATIONS

DTK-120SR		DTK-2MHLPWB			
Service Voltage	120V	Service voltage			
MCOV	150V	5B	0-5 VDC	36B	36 VDC
Suppressed Voltage		12B	12 VDC	48B	48 VDC
Rating	600V	24B	24 VDC	75B	75 VDC
Max Continuous Current	20A	MCOV/Let-Through Voltage			
EMI/RFI Attenuation	Up to 35dB, 100kHz-100MHz	5B	5/6.8 VDC	36B	48/57 VDC
Peak Surge Current	54,000 amps	12B	18/21.6 VDC	48B	64/76 VDC
Protection	L-N, L-G, N-G	24B	33/39 VDC	75B	90/108 VDC
Operating Temperature	32° to 104°F (0° to 40°C)	Max Continuous Current			
Dimensions	6.87"W x 3.50"H x 2.50"D (17.45 x 9.06 x 6.35 cm)	5A			
Weight	0.76 lb (0.45 kg)	Peak Surge Current			
Approvals	UL1449, 3rd Edition	20kA			
Warranty	10-year limited	Data Rate			
		200kbps (5V) to 2Mbps (130V)			
		Protection			
		L-G (all lines protected)			
		Connections			
		Edge card into DTK-MB mounting base			
		Operating Temperature			
		-40° to 158°F (-40° to 70°C)			
		Dimensions			
		2.1"H x 0.9"W x 1.4"D (5.3 x 2.3 x 3.6 cm)			
		Weight			
		0.078 lb (0.036 kg) - with base			
		Approvals			
		UL 497B, DTK-120SR Recognition, File # E328921, DTK-2MHLP UL File #E14557			
		Warranty			
		10-year limited			

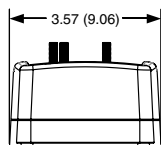
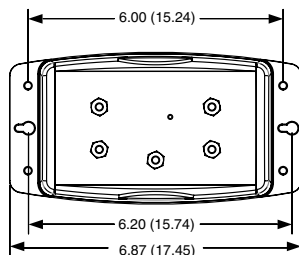
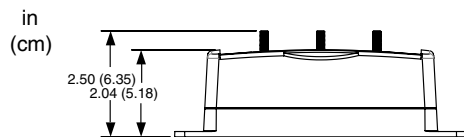


POWER MONITORING & PROTECTION

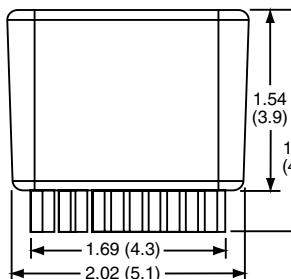
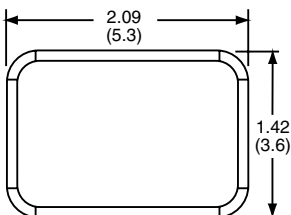
POWER/DATA SURGE PROTECTOR

DTK-120SR, DTK-2MHLP

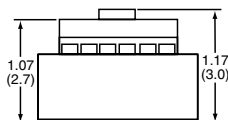
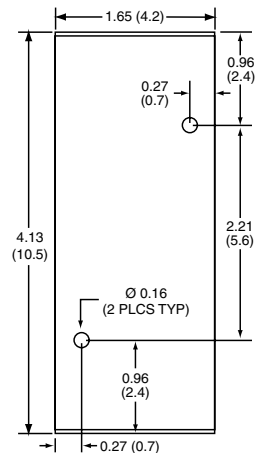
DIMENSIONS



DTK-120SR

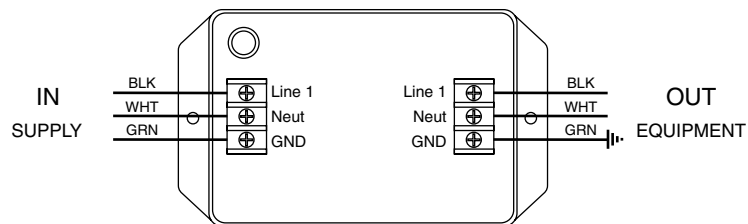


DTK-2MHLP



DTK-MB

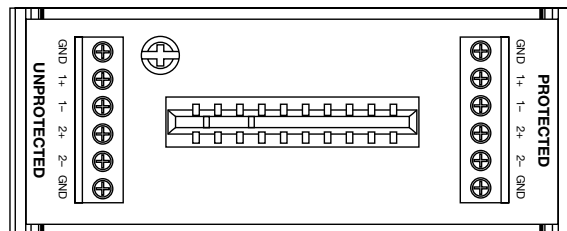
WIRING



DTK-120SR

Expected System Voltages			
120 VAC	L-N	L-G	N-G
Voltages	120	120	0

Note: If the DTK-120S15A is not installed inside the control panel/cabinet, provide an appropriate enclosure per NEC, NFPA, and all applicable codes.



DTK-MB

ORDERING INFORMATION

MODEL	DESCRIPTION
DTK-2MHLP5BWB	Surge protector, 5 VDC data line with base
DTK-2MHLP12BWB	Surge protector, 12 VDC data line with base
DTK-2MHLP24BWB	Surge protector, 24 VDC data line with base
DTK-120SR	Surge protector, 120 VAC in-line, 20A continuous

POWER MONITORING & PROTECTION

54KA SERIES CONNECTED SURGE PROTECTOR WITH DRY CONTACTS

DTK-120SRD, DTK-TSS4D



POWER MONITORING & PROTECTION

16

DESCRIPTION

Ditek's **54kA Series Connected Surge Protectors with Dry Contacts** protects 120V power on electrical circuits and control panels and has Dry Contacts for remote notification of surge protection status. The hybrid series design provides maximum critical load protection, with EMI/RFI filtering. The **DTK-120SRD** is ideal for use in UL listed control panels where a UL Recognized component is required. LED indicates the protection status. **DTK-TSS4D** is ideal for use when a UL Listed SPD is required.

NEW!



DTK-120SRD



DTK-TSS4D

FEATURES

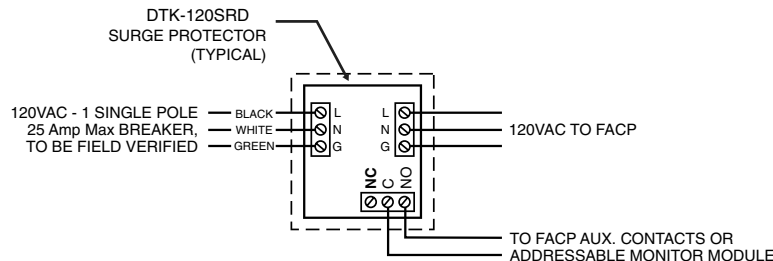
- **Series design for fast response and best protection**
- **Multi-stage hybrid circuit design**
- **Suitable for use on circuit breakers rated at 10kA AIC**
- **UL 1449 & 1283 EMI/RFI filtering**
- **Form C Dry Contact circuit**
- **DTK-TSS4D only in NEMA 4X weatherproof enclosure**
- **10 Year limited warranty**

SPECIFICATIONS

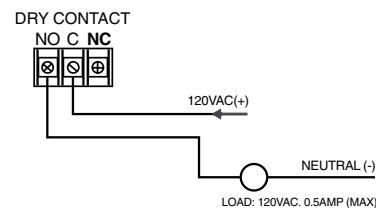
Supply Voltage	120VAC	Housing Type	
Maximum Continuous		DTK-120SRD	ABS
Operating Voltage	150VAC	DTK-TSS4D	Polycarbonate
Short Circuit		Dimensions	
Current Rating	10kA	DTK-120SRD	6.87" W x 3.50" H x 2.50" D (17.45 x 8.89 x 6.35 cm)
Nominal Discharge		DTK-TSS4D	9.50" W x 6.25" H x 3.63" D (24.1 x 15.9 x 9.2 cm)
Current Rating	3kA	Weight	
Maximum Continuous		DTK-120SRD	0.76 lb (0.34 kg)
Current	20A	DTK-TSS4D	1.85 lb (0.84 kg)
Peak Surge Current	54,000 Amps	Approvals	cUL, UL 1283, UL1449 3rd Edition
Temperature Range	32 to 104°F (0 to 40°C)	Warranty	10 year limited
Protection			
DTK-120SRD	Type 2 component assembly		
DTK-TSS4D	Type 2 SPD		

WIRING

EXAMPLE REMOTE MONITORING USING FACP FOR NOTIFICATION



EXAMPLE MONITORING CIRCUIT



ORDERING INFORMATION

MODEL

DTK120-SRD

DTK-TSS4D

DESCRIPTION

120V surge protector, dry contacts, hybrid design, ABS housing

120V surge protector, dry contacts, hybrid design, NEMA 4X



POWER MONITORING & PROTECTION

DATA LINE SURGE PROTECTOR

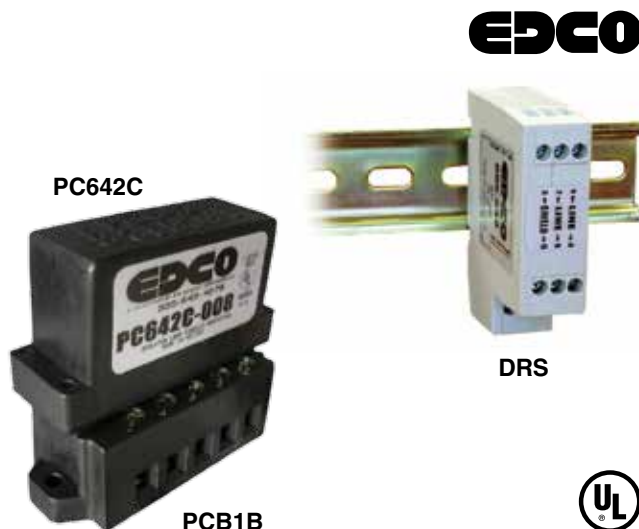
DRS, PC642C SERIES

DESCRIPTION

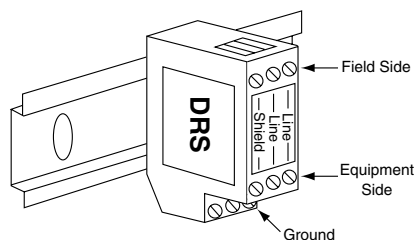
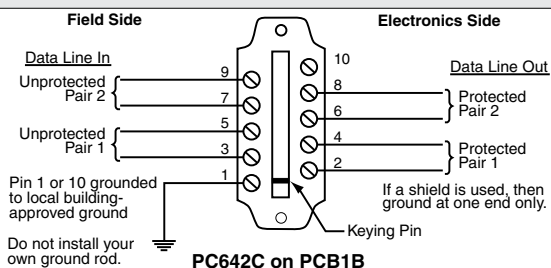
The **Model PC642C Series** surge suppressor is a dual-pair (four wire) and the **DRS Series** is a single pair (two-wire) DIN rail mount module implementing three-stage hybrid technology. These modules protect against over-voltage transients with gas tubes and silicon avalanche components. In addition, sneak and fault currents are mitigated with automatic resetting fuses (PTCs). The PTCs increase resistance several orders of magnitude when over currents are present and return to normal when over-currents are removed. The ability to self-restore in this manner significantly increases suppressor performance and survivability.

FEATURES

- **Lightning protection for low voltage signal lines**
- **Three-stage protection**
- **Plug-in and DIN rail mount modules**
- **Automatic recovery**
- **Nanosecond response time**



WIRING



SPECIFICATIONS

Voltage Clamp	(±10%) 8, 15, 30, or 36V	Capacitance	1500 pF; PC642 w/ LC option: 50 pF
Response Time	<1 ns	Operational Current	Maximum 150 mA @ clamp voltage
Peak Surge Current	<10 kA (8 x 20 µs)	Protector	
Life Expectancy	>100 occurrences @ 2000A, 8 x 20 µs	Primary	Three-element gas tube (GDT)
Series Resistance	5Ω nominal	Secondary	Rugged solid-state avalanche diode (SAD)
Operating Temperature	-40° to 185°F (-40° to 85°C)	Third	Positive temp coefficient device (PTC)
Dimensions		Approvals	UL497B, File #E175287
PC642C, PCB1B	2.5"H x 1.0"W x 2.0"D (6.1 x 2.5 x 5.1 cm)	Weight	0.06 lb (0.03 kg)
DRS	2.95"H x 0.8"W x 2.35"D (7.5 x 2.0 x 6.0 cm)	Warranty	1 year

ORDERING INFORMATION

MODEL	DESCRIPTION
PC642C	Dual-pair (four-wire) surge protector, base mount (PCB1B required)
DRS	Single-pair (two-wire) surge protector, DIN rail mount
	-008 Clamp voltage, 8V
	-015 Clamp voltage, 15V
	-030 Clamp voltage, 30V
	-036 Clamp voltage, 36V
	-LC Low capacitance option (PC642C only)
PCB1B	Mounting/connector base for PC642C

POWER MONITORING & PROTECTION

POWER & DATA LINE SURGE PROTECTOR

FAS-TEL, HSP-121BT1RU



EDCO

DESCRIPTION

The **HSP-121BT1RU** is an advanced, three-stage, hybrid solid-state power line protector. It is an in-line style surge protector designed for mounting in an enclosure or control panel to protect sensitive electronic controls from noise, surges, and spikes that are present on the power lines. The **HSP-121** is UL recognized.

The **FAS-TEL** is an advanced two-stage hybrid, solid-state phone and data line surge protector. It is designed to protect electronic equipment from unwanted surges and transients that may be present on the phone line or communications data lines. The **FAS-TEL** is UL Listed.

FEATURES

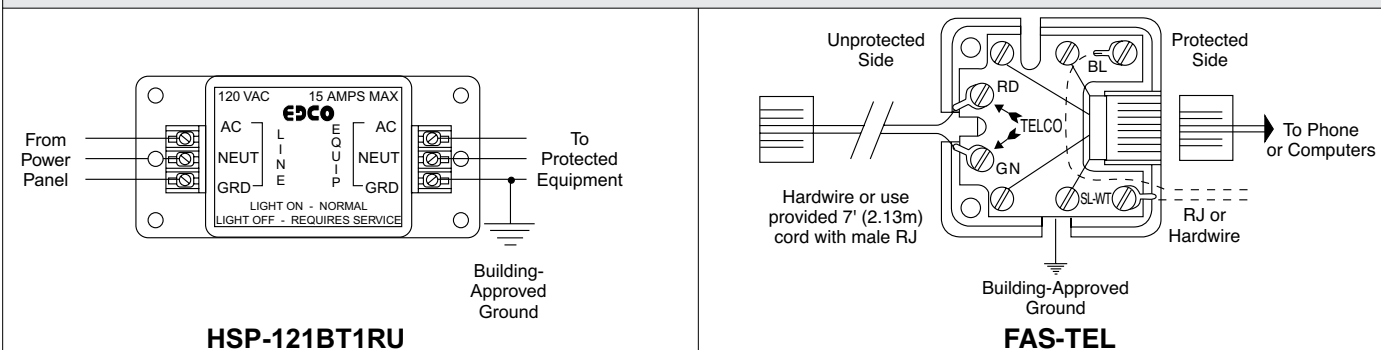
- Protection from overvoltage transients
- Three-stage hybrid technology
- Automatic recovery
- Fast response time



SPECIFICATIONS

HSP-121BT1RU		FAS-TEL	
Supply Voltage	120 VAC, 60 Hz	Signal Voltage	220V Peak
Supply Current	15A	Continuous Current	Unlimited
LED Indication	Extinguishes on overload or internal protection failure	Nominal Breakdown Voltage	270V
Clamping Level	Maximum 325V L-N, 350V L-G	Protection	Between TIP/RING/GND
Clamping Category	330V L-N, 400V L-G ANSI/IEEE C62.41 1991-CAT.C1/B3	Capacitance	50 pF
Surge Current	Maximum 10,000A	Series Resistance	8Ω
Fusing	15A slowblow (GF-15S) Blown fuse will disconnect load from power source.	Surge Current	Maximum 100A, 10 x 1000 μs
Response Time	<5 ns	Response Time	<1 ns
Connections	Terminals	Connections	1 female, 1 male RJ11 jacks
Operating Temperature	-3° to 186°F (-20° to 85°C)	Operating Temperature	-40° to 149°F (-40° to 65°C)
Dimensions	2.95"H x 5.25"W x 2.0"D (7.5 x 13.3 x 5.1 cm)	Dimensions	2.0" H x 2.0" W x 1.0" D (5.1 x 5.1 x 2.5 cm)
Weight	0.83 lb (0.38 kg)	Weight	0.5 lb (0.22 kg)
Approvals	UL 1449A recognized component, File# E324279	Approvals	UL 1449 listed, File #E118759
Warranty	5 years	Warranty	1 year

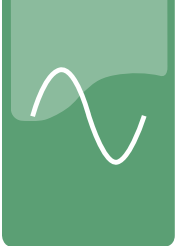
WIRING



ORDERING INFORMATION

MODEL
HSP-121BT1RU
FAS-TEL

DESCRIPTION
120 VAC inline surge protector with terminal block
Data line/telephone line protector



POWER MONITORING & PROTECTION

DIN RAIL MOUNT SURGE PROTECTION OVR DIN SERIES

DESCRIPTION

The **OVR DIN Rail Surge Protection Devices** are the pluggable AC DIN rail devices. They are UL 1449 3rd edition. Over 80% of transient surges are caused by internal sources such as load switching and normal equipment operations. Installation of these SPD's will provide protection to valuable equipment and help keep an operation up and running. Installation at branch panels, control panels and terminal equipment is recommended to provide the most complete protection. The **OVR DIN Rail** series utilize fast acting metal oxide varistor technology to limit overvoltage to values compatible with the sensitive equipment connected to the network.

NEW!

ABB



OVRT23N40320PTSU

FEATURES

- **MOV technology**
- **End of life indicator**
- **Pluggable replaceable cartridges**
- **Remote indication (only on -TSU models)**



SPECIFICATIONS

Supply Voltage	120 VAC, 277 VAC, 347 VAC, 480 VAC, 600 VAC, 230 VAC
Let Through Voltage	See technical data sheet for specifications
Surge Current	15 kA, 40 kA, 70 kA
Response Time	<25ns
Dimensions	
One Pole	0.7" W x 3.3" H x 2.6" D (1.8 x 8.4 x 6.4cm)
Two Pole	1.4" W x 3.3" H x 2.6" D (3.6 x 8.4 x 6.4 cm)
Three Pole	2.1" W x 3.3" H x 2.6" D (5.3 x 8.4 x 6.4 cm)
One Pole + N	1.4" W x 3.3" H x 2.6" D (3.6 x 8.4 x 6.4 cm)
Two pole + N	2.1" W x 3.3" H x 2.6" D (5.3 x 8.4 x 6.4 cm)
Three Pole + N	2.8" W x 3.3" H x 2.6" D (7.1 x 8.4 x 6.4 cm)
Weight	
One Pole	0.25 lb (0.1 kg)
Two Pole/ One Pole + N	0.5 lb (0.2 kg)
Three Pole/Two Pole + N	0.75 lb (0.3 kg)
Three Pole + N	1.0 lb (0.45 kg)
Approvals	CE, RoHS, UR File #E322885
Warranty	1 year

ORDERING INFORMATION

Model	Description
OVRT2	ABB surge protection device for Type 2 applications
(Blank)	1 phase
2L	2 phase
3L	3 phase
1N	1 phase + neutral
2N	2 phase + neutral
3N	3 phase + neutral
15	15 kA surge capacity (I_{max})
40	40 kA surge capacity (I_{max})
150	150V Max Continuous Voltage
320	320V Max Continuous Voltage
440	440V Max Continuous Voltage
550	550V Max Continuous Voltage
660	660V Max Continuous Voltage
P	pluggable
(Blank)	no auxiliary contact
TS	with optional auxiliary contact
U	UL 144p 3 rd Edition

OVRT2	2N	40	320	P	TS	U
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Example: OVRT22N40320PTSU

Type 2 surge protector, 2 phase + neutral, 40 kA surge capacity, 320V, pluggable, with optional auxiliary contact



DESCRIPTION

The **Model 392-SVSR2** is a two-pair gas tube lightning arrester in a plastic outdoor enclosure. It protects the communication lines that run between buildings against high voltage transients caused by motors, transmitters, lightning, etc.

Transients can be harmful and even capable of destroying building automation systems. It is recommended that the **Model 392-SVSR2** be used at all points where communication cables exit or enter a building. To protect low voltage communication inputs on Building Automation Systems, this device should be used in conjunction with an appropriate voltage level surge protector such as a Model DTK-2LVLP.



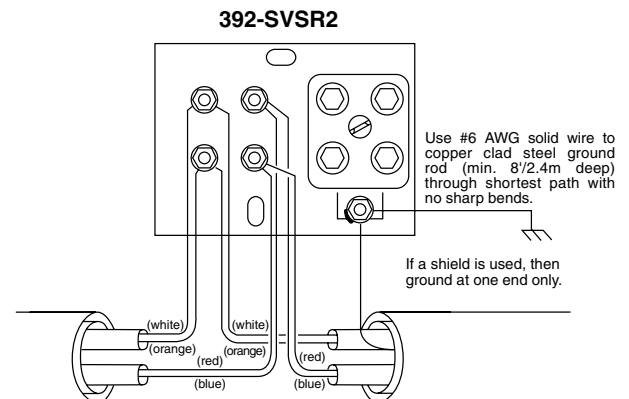
392-SVSR2



SPECIFICATIONS

Impulse Breakdown @100V/μsec	300-750V
DC Holder	150 VDC extinguishing in less than 150 ms
Insulation Resistance (initial)	<100 MΩ
Capacitance	5 pF
Impulse Life Specification Rated Heavy-Duty	80% survival to 400 surges of 500A
AC Discharge Current	65A, 11 cycle, 60 Hz
End-Of-Life Limits	
Insulation Resistance	<1 MΩ
DC Breakdown Voltage	<180V
Impulse Breakdown Voltage	<900V
Vented (back-up) DC Breakdown Voltage	<1600V (100-200 avg)
Max Single Impulse Discharge Current	10 kA, 8 x 20 μsec surge
Dimensions	3.5"H x 3.75"W x 2.5"D (8.9 x 9.5 x 6.4 cm)
Weight	0.85 lb (0.39 kg)
Approvals	UL listed File #E2332

WIRING

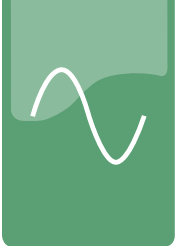


Notes: To protect low-voltage communication circuits, this device should be used in conjunction with an appropriate voltage level surge protector such as the Model DTK-2LVLP.

When applying surge protectors, use of the protection zone concept is recommended.

ORDERING INFORMATION

MODEL	DESCRIPTION
392-SVSR2	Lightning arrester



POWER MONITORING & PROTECTION

METAL OXIDE VARISTOR, TRANSZORB V130LA1, V39ZA1, V47ZA1, 1.5KE56CA

DESCRIPTION

Metal Oxide Varistor (MOV) and **Transzorb Voltage Transient Suppressors** reduce high voltage spikes that could damage or confuse sensitive electronic circuits. Voltage spikes often will cause digital logic circuits to select an incorrect logic state or lock up entirely.

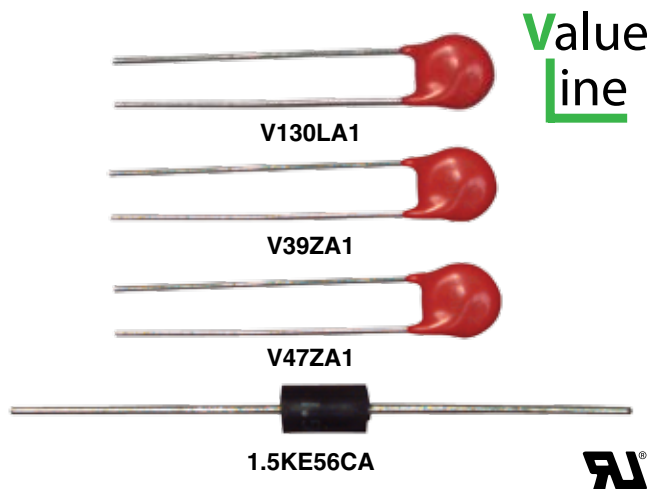
CAUSES OF VOLTAGE SPIKES

Voltage spikes appear in the user's circuit in three main ways:

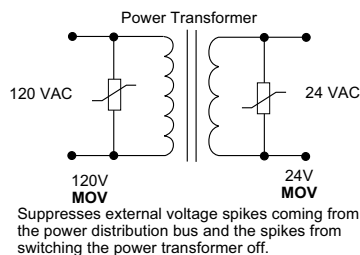
1. Voltage spikes come in on the power distribution bus and are coupled to the user's circuits by the winding-to-winding capacitance of the user's power transformers.
2. Voltage spikes are generated in the power transformer secondary when the power transformer primary is turned off and the transformer's magnetic field collapses.
3. Voltage spikes are generated within the user's circuits when an inductive load is switched off and the load's magnetic field collapses. Voltage noise is also generated at the switched contacts and is radiated to the wires leading to the user's microprocessor.

OPERATION

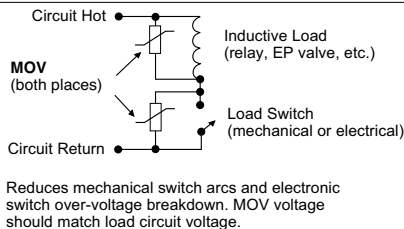
When a voltage at or below the suppressor's nominal voltage is applied, the suppressor acts essentially like an open circuit. When a high-voltage spike appears across the suppressor the suppressor conducts or turns on, shunting the excess energy to the circuit return path, thereby reducing the amplitude of the voltage spike. When the voltage spike subsides, the suppressor reverts back to its open circuit state. **MOV** suppressors are bi-directional and can be used to protect both AC and DC circuits. They provide a somewhat soft clamping action in that the amplitude of the reduced voltage spike rises noticeably with the amount of energy contained in the spike. **Transzorb** suppressors come in unidirectional and bi-directional versions. The uni-directional versions are polarity-sensitive and can only be used in DC applications. The bi-directional versions may be used in both AC and DC circuits just like the **MOV**. **Transzorbs** have a faster response time and a much harder clamping action than **MOVs** because voltage spikes are clipped at a more consistent level independent of their energy content. The **Transzorb** sold by Kele is a bi-directional version. Note: Kele carries the varistors and transzorbs most often specified by the BAS manufacturers. They are general-purpose in nature and should cover most applications at the recommended voltage.



WIRING



Transformer Installation



Coil and Switch Installation

AGENCY APPROVALS

V130LA	UL-recognized component, File #E75961 and E56529
V39ZA1/V47ZA1	UL-recognized component, File #E135010
1.5KE56CA	UL-recognized component, File #E116110

ORDERING INFORMATION

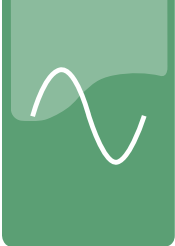
MODEL	DESCRIPTION
V130LA1	130 VAC/175 VDC varistor voltage transient suppressor
V39ZA1	25 VAC/31 VDC varistor voltage transient suppressor
V47ZA1	30 VAC/38 VDC varistor voltage transient suppressor
1.5KE56CA	24 VAC/VDC transzorb voltage transient suppressor



FORMULAS TO DETERMINE AMPERES, hp, kW, and kVA			
To Find	Direct Current	Alternating Current	
		Single-Phase	Three-Phase
Amperes (I) when horsepower is known	$\frac{hp \times 746}{E \times \%eff}$	$\frac{hp \times 746}{E \times \%eff \times pf}$	$\frac{hp \times 746}{1.73 \times E \times \%eff \times pf}$
Amperes (I) when kilowatts is known	$\frac{kW \times 1000}{E}$	$\frac{kW \times 1000}{E \times pf}$	$\frac{kW \times 1000}{1.73 \times E \times pf}$
Amperes (I) when kVA is known		$\frac{kVA \times 1000}{E}$	$\frac{kVA \times 1000}{1.73 \times E}$
Kilowatts (kW)	$\frac{I \times E}{1000}$	$\frac{I \times E \times pf}{1000}$	$\frac{I \times E \times 1.73 \times pf}{1000}$
kVA		$\frac{I \times E}{1000}$	$\frac{I \times E \times 1.73}{1000}$
Horsepower (output)	$\frac{I \times E \times \%eff}{746}$	$\frac{I \times E \times \%eff \times pf}{746}$	$\frac{I \times E \times 1.73 \times \%eff \times pf}{746}$

COMMON ELECTRICAL TERMS	
Ampere (I)	Unit of current or rate of flow of electricity
Volt (E)	Unit of electromotive force
Ohm (R)	Unit of resistance
	Ohms Law: $I = \frac{E}{R}$ (DC or 100% pf)
%eff	Motor efficiency (Note: If unknown assume %eff x pf = 0.7 for 25 hp or less) 0.8 above 25 hp
Megohm	1,000,000 ohms
Volt amperes (VA)	Unit of apparent power $E \times I$ (single-phase) $E \times I \times 1.73$ (three-phase)
Kilovolt Amperes (kVA)	1000 volt - amperes
Power Factor (pf)	Ratio of true to apparent power $\frac{W}{VA}$ or $\frac{kW}{kVA} = \cos \phi$ (ϕ = angle current leads or lags voltage)
Watt Hour (Wh)	Unit of electrical work One watt for one hour 3.413 Btu
Kilowatt Hour (kWh)	1000 watt hours
Horsepower (hp)	Measure of time rate of doing work Equivalent of raising 33,000 pounds 1 foot in 1 minute 746 watts

MOTOR APPLICATION FORMULAS	
Torque (lb-ft)	$= \frac{hp \times 5250}{rpm}$
Shaft stress (pounds per square inch)	$= \frac{hp \times 321,000}{rpm \times shaft \text{ dia}^3}$
For pumps	
Horsepower	$= \frac{gpm \times head \text{ in feet} \times \text{specific gravity}^*}{3960 \times \text{mechanical efficiency of pump}}$ (*Water - 1.00, Ethylene glycol - 1.125)
Speed	
Synchronous rpm	$= \frac{Hertz \times 120}{Poles}$
Percent slip	$= \frac{synchronous \text{ rpm} - full \text{ load rpm}}{synchronous \text{ rpm}} \times 100$



POWER MONITORING & PROTECTION

POWER EQUATIONS

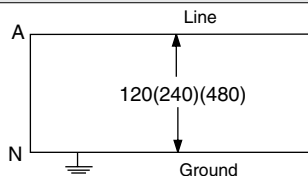
SINGLE-PHASE VOLTAGE DROP

$$\Delta V = \frac{\text{amps} \times (\text{length of circuit in ft}) \times 2 \times (\text{ohms per 1000 ft})}{1000}$$

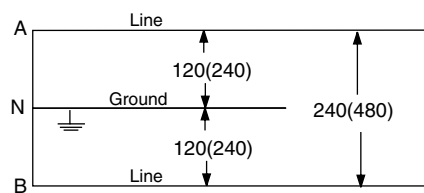
$$\Delta V = \frac{I \times L \times 2 \times R}{1000} \quad \text{* Change to 1.73 for three-phase}$$

Wire Size AWG (Stranded)	ohms/1000 ft (@ 77°F)
24	25.67
22	16.46
20	10.35
18	6.512
16	4.095
14	2.576
12	1.620

SINGLE-PHASE (VAC)

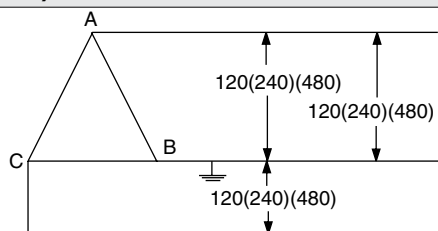


Two-wire

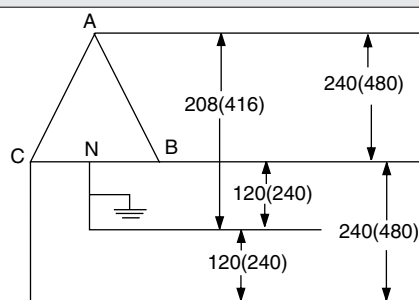


Three-wire

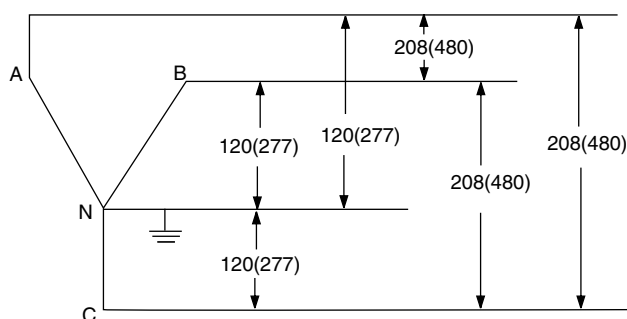
POLYPHASE (VAC)



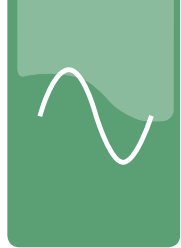
Three-phase Three-wire



Three-phase Four-wire Delta



Three-phase Four-wire Wye



DETERMINING BURDEN FOR CURRENT TRANSFORMERS

If a current transformer (CT) reads low, then the secondary is probably overloaded. Burden is the load which may be imposed on a transformer secondary by cables and connected devices without causing an error greater than the stated accuracy classification. Lower burden and proper sizing can improve the accuracy of the CT. It is a good idea to check your CT burden if the CT primary rating is under 200A.

Burden is expressed in ohms impedance or volt-amperes for current transformers. The standard burden limits are defined by ANSI C57.13.

CURRENT TRANSFORMERS

CTs carry an ANSI burden designation "B" followed by the ohms limit (e.g., B0.1). Below is a typical CT specification in our catalog:

Model #	Current Ratio	ANSI Meter Class at 60 Hz			Allowable burden in ohms (0.5 max)
		B0.1 2.5 VA	B0.2 5 VA	B0.5 12.5 VA	
600T-122	1200:5	0.6	1.2	1.2	Allowable burden in volt-amperes (12.5 VA max)

Accuracy at burden above (e.g., $\pm 1.2\%$)

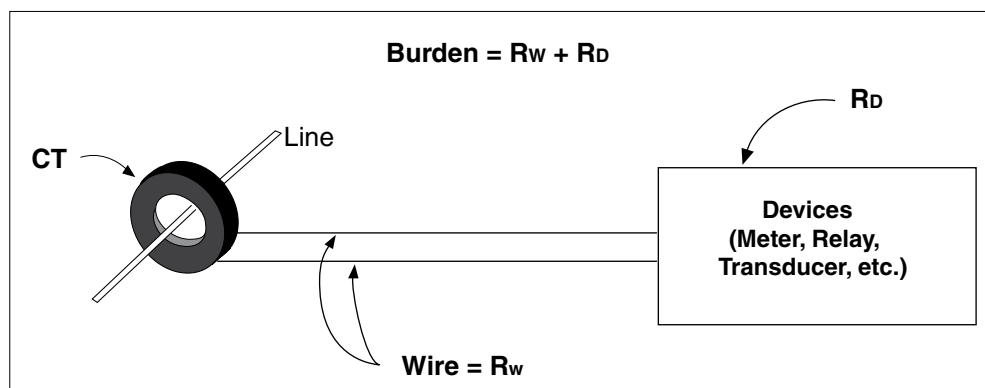
CT primary to secondary ratio

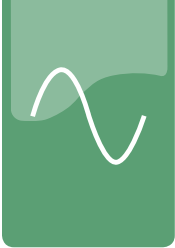
You can see from the above example that if the total burden (wire plus device) is only 2.5 VA, the accuracy of the reading will be $\pm 0.6\%$. If a higher burden (up to 12.5 VA) is used, the accuracy will be $\pm 1.2\%$.

For lower-line currents, the accuracy at 10% of the CT rating (120A through a 1200:5 CT) is double the published value. On the above example, at 2.5 VA burden, the accuracy would be $\pm 1.2\%$. At a 12.5 VA burden, the accuracy would be $\pm 2.4\%$.

BURDEN CALCULATION

- STEP 1:** Determine the burden of the connected device in VA or ohms impedance. This should be on the device data sheet.
- STEP 2:** Add impedance of the secondary wire run. Measure the length of the wire run between current transformer and the burden (e.g., meter, relay, transducer, etc.). Refer to Nomogram No. 2 and determine the resistance, in ohms, of the wires that connect the secondary of the current transformer to the devices. The Nomogram makes allowances for the return wire. Add this resistance from Nomogram No. 2 to the impedance of the connected burdens. Nomogram No.1 will help convert ohms to VA.
- STEP 3:** Make sure the total burden does not exceed the specified limits for the chosen CT.





POWER MONITORING & PROTECTION

SURGE PROTECTION CHART

SURGE PROTECTION CHART

Device	SURGE PROTECTION		POWER AC/DC							DDC POINTS				COMMUNICATON						
	Technology 1st/2nd/3rd/4th Stage	Clamp Level	5V	12V	24V	36	48	75	120V	DI	AI/AO	DO-24V Flt/Ctrl	DO- 120V	RS 232	RS 422	485	Phone	Ethernet	Arcnet	Modem Short Haul
DTK-120SR	TP MOV, LC, Fused MOV	160V							X				X							
HSP-121BT1RU	MOV, F, LC, MOV	315V							X				X							
FAS-TEL	AD, F	300V															X-> (model dial in w/ring)			
PC642C-008	GT, AD, PTC	8V													X	X				
PC642C-012	GT, AD, PTC	12V								X								X		
PC642C-015	GT, AD, PTC	15V								X										X
PC642C-030	GT, AD, PTC	30V									X	X		X					X	
DTK-2MHLP5BWB	AD, GT, F	6.8	X							X	X				X	X		X		
DTK-2MHLP12BWB	AD, GT, F	21.6		X						X	X			X				X		
DTK-2MHLP24BWB	AD, GT, F	39			X					X	X	X							X	
DTK-2MHLP36BWB	AD, GT, F	57				X				X	X									
DTK-2MHLP48BWB	AD, GT, F	76					X			X	X									
DTK-2MHLP75BWB	AD, GT, F	108						X		X	X									
392-SVSR2	Dual GT	300-750V	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X
DTK-MRJ11	MOV, F	184-224V															X-> (no ring direct connect)			
DTK-2LVLP	MOV	15V or 27V													X	X		X	X	X
DTK-120HW	MOV	130V							X				X							
V130LA1	MOV	130V							X				X							
V392A1 / V47ZA1	MOV	25V			X					X	X	X								
1.5KE56CA	Transorb (AD)	56V								X	X	X								
DRS-008	GT, AD, PTC	8V													X	X				
DRS-015	GT, AD, PTC	15V								X								X		X
DRS-030	GT, AD, PTC	30V									X	X		X					X	
DRS-036	GT, AD, PTC	36V									X	X		X					X	

SURGE PROTECTION TECHNOLOGIES

Device Technology

Fuse (F)

Fuses are used to suppress high currents by failing open to the protected circuit if other surge devices fail. Response time is less than one second.

LC

Inductive/Capacitive LC passive filter @ 60 Hz.

Thermal Fuse

Thermal fuses are used to cut out on high temperatures by failing open to the protected circuit. Response time is several seconds.

Gas Tube (GT)

Gas tubes are used to shunt to ground very high voltages (>300V), such as lightning. Response time is about 150 milliseconds.

MOV or Varistor

Metal oxide varistors (MOV) are used to shunt to ground low to medium voltages (15-130V) at low current. Typical response time is five nanoseconds.

Zener Diode

Zener diodes are used to clip and shunt to ground medium voltages (200V). Typical response time is less than one nanosecond.

PTC

Positive temperature coefficient (PTC) thermistors open the circuit during a surge and suppress low voltages (8-30V). Typical response time is less than one second.

Avalanche Diode (AD) or Transorb

Silicon avalanche suppression diodes are used to clip and shunt to ground low to medium voltages (8-30V). Typical response time is less than five nanoseconds.

TP MOV

Thermal Protected MOV

Types of Surges

Lightning

Typical rise time of 1-20 microseconds, surge currents 20 kA (20,000A) to 250 kA

Power Fluctuations

Typically occur in 20-300 microseconds.

SURGE PROTECTION CHART & TECHNOLOGIES

1. Select a surge protector with a clamping voltage that is higher than the system voltage that is being protected.
2. Apply the "Protection Zone Concept," and keep all grounds inside the protection zone at the same potential. If different ground potentials are present on electronic equipment, damage will occur regardless of the suppression used.
3. Protect all electrical and data circuits entering or leaving the protection zone at the protection zone ground window. Doing this keeps circuits at a safe voltage with respect to the ground window. This safe voltage is the clamp voltage (let-through voltage) of the respective suppressors.



APPLYING SURGE PROTECTORS

Surge protectors are relatively simple devices, yet they must be carefully selected and applied to function properly. When selecting and applying surge protectors, there are a few essentials to keep in mind.

First, the operating voltage of the system is important. Surge protectors are voltage sensitive switches and must not clamp the normal system voltage. The surge protector clamp voltage must be higher than the system voltage. For example, a 24 VDC system voltage generally uses a 30 volt surge protector.

Second, some surge protectors have an input side and an output side. If installed backwards, they will fail prematurely.

Lastly, grounding is often misunderstood when it comes to proper installation of surge suppressors. This can seriously affect the performance of protection systems and lead to electronics damage. Use the Protection Zone Concept to effectively apply surge protectors to EMS and BAS installations.

The Protection Zone

The protection zone is an imaginary circle drawn around and encompassing electronic equipment items that are located in close proximity to each other (see Figure 1). Everything passing through the imaginary circle should be commonly grounded and should have surge protection.

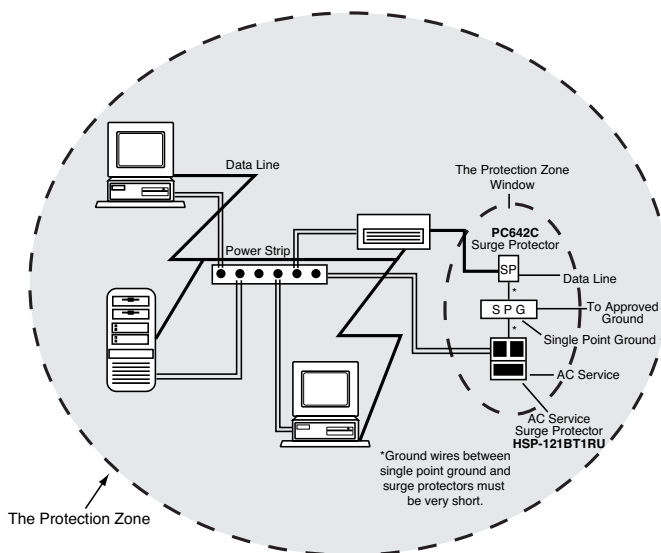


Figure 1. The Protection Zone, Window, and Single Point Ground

The single point ground is a common ground point or node used in the protection zone to bond together all ground references inside the zone. Surge currents passing through a ground conductor generate a voltage across the conductor. This is primarily due to inductance of the wire. Inductance is highly dependent on conductor length; therefore, it is very important to keep suppressor ground wires to the single point ground very short.

The protection zone window is a hypothetical small opening in the zone through which all electrical conductors enter or leave. The single point ground is located at the protection zone window. Figure 2 illustrates a typical installation of equipment within a small area; however, there are three problems associated with the installation depicted.

Problem #1

There are four ground references in Figure 2. AC outlet #1, AC outlet #2, AC outlet #3, and the data line all present separate ground references. The three AC outlet grounds are connected together at the power panel many feet away. The ground wire lengths offer enough inductance to effectively create separate grounds. In addition, the data line may run hundreds of feet to yet another ground reference in remote circuitry.

Problem #2

Notice in Figure 2 there is substantial distance between various conductors leaving the imaginary circle of the protection zone. Even if ground conductors were bonded together, destructive voltages would exist during a surge due to wire inductance.

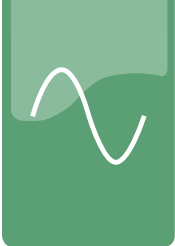
Problem #3

While the data line shows a surge suppressor, the lack of suppressors in the power receptacles leaves an opening in the protection zone. Even the best data line suppressor cannot prevent damage under these conditions.

Solving the Problems

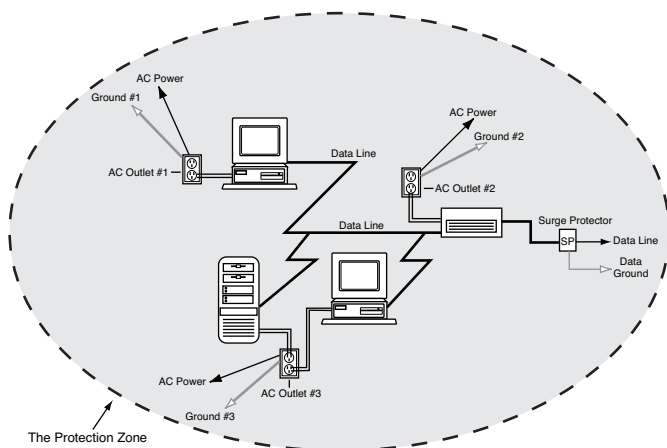
The problems listed for the installation in Figure 2 are solved using the Protection Zone Concept. Figure 1 illustrates the proper installation:

- All devices are powered from the same AC outlet.
- The AC service incorporates a Model HSP-121BT1RU surge suppressor.
- The single point ground is established in the protection zone window.
- Data line suppressor(s), Model PC642C, are added at the single point ground.
- A ground bus bar is located at the ground area to facilitate multiple ground connections.



APPLYING SURGE PROTECTORS

Figure 2. Typical Installation of Equipment within a Small Area



- Ground wires to the suppressors are very short.
- An optional (depending on code) ground conductor connects the ground bus to the main building power ground. This conductor may be quite long, but that does not create a problem now that the ground area has been established.

Protecting Multibuilding Data and Control Systems

The Protection Zone Concept can also be applied to multibuilding, multidrop data and control systems. In Figure 3, the surge protectors located at the building entrance are improperly positioned to protect the CPU and the controllers. During lightning activity, ground potentials at opposite ends of a building can be thousands of volts, causing damage to electronic equipment. Also, surge protectors for data lines that enter buildings have series resistance. The series resistance of the surge protectors is additive. The total series resistance often is too great and can cause communication or data line problems. The installation in Figure 3 shows five protectors in series over the length of the data line.

To properly configure surge protection on a multibuilding, multidrop system (see Figure 4), connect the surge protector on each controller drop so that the protector is not in series

with the main data line. When connected in this manner, no more than two surge protectors are connected in series. Using the Protection Zone Concept, locate the data line surge protectors within the protection zone window along with an AC service outlet surge protector for each respective controller. Remember to keep the ground connections to the single point ground very short.

Summary

Remember the following when applying surge protection:

1. Keep all grounds inside the protection zone at the same potential. If different ground potentials are present on electronic equipment, damage will occur regardless of the suppression used.
2. Protect all electrical and data circuits entering or leaving the protection zone at the protection zone ground window. Doing this keeps circuits at a safe voltage with respect to the ground window. This safe voltage is the clamp voltage (let-through voltage) of the respective suppressors.

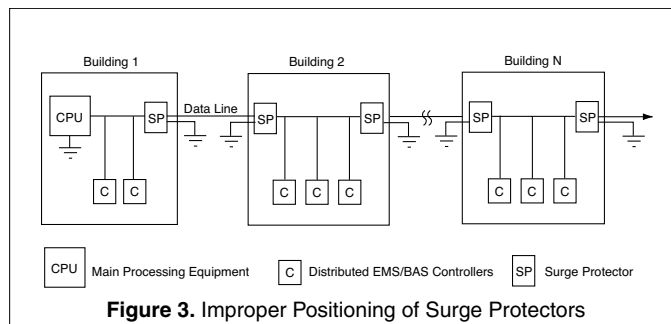


Figure 3. Improper Positioning of Surge Protectors

The majority of surge protection installations are fairly simple and only involve bonding suppressor grounds to AC service grounds at the ground window. Existing sites may involve some rewiring to accomplish the best results. In order to keep the data line surge suppressor ground and AC service ground wires very short, wiring must sometimes be moved. When applying surge protectors, using the Protection Zone Concept will effectively protect EMS and BAS installations.

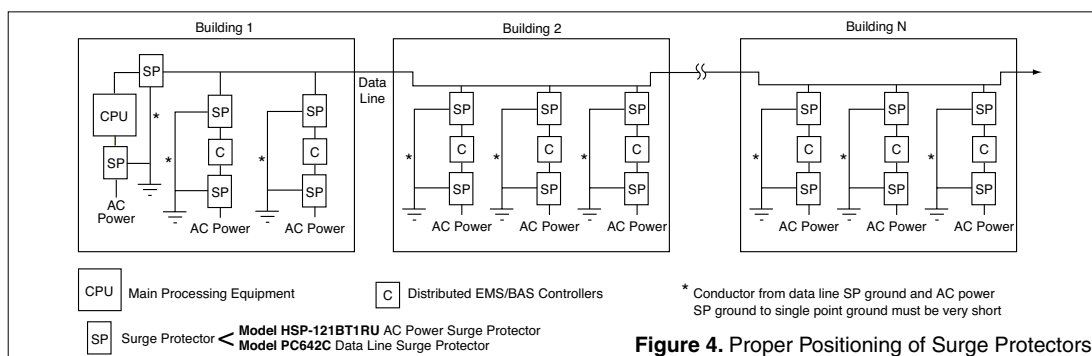


Figure 4. Proper Positioning of Surge Protectors